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COMPILED FROM WORLD LITERATURE ON
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Volume 39

COMMONWEALTH MYCOLOGICAL INSTITUTE
KEW, SURREY
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ERRATA

VOLUME 29

page 603 line 39 for 'pear' read 'apple'

VOLUME 35

280 16 for 'gooseberry' read '[cape] gooseberry (*Physalis peruviana*)'

VOLUME 38

111 24 for 'virus' read 'caused by bean virus 2 [bean yellow mosaic virus]'
27 for 'pea' read 'bean yellow'
191 27 for 'symptomless' read 'symptom-bearing'
33 delete 'symptomless'
658 49 for 'JERKES' read 'YERKES'
767 10 for 'map 211' read 'map 210'

VOLUME 39

13 26 for '*S. rimsosus*' read '*S. rimosus*'
14 26 for 'KRISTOVA' read 'KHRISTOVA'
20 25 for 'GEDDES, W. M.' read 'GEDDES, W. F.'
22 20 for 'cicadae' read 'leafhoppers'
68 40 for '*P. funicolosum*' read '*P. funiculosum*'
120 6 for '*Thomasina*' read '*Thomasiniana*'
122 22 for '*Biológica*' read '*Biológico*'
181 49 for 'Muri' read 'Muir'
195 31 for '*pseudacacia*' read '*pseudoacacia*'
197 12 for 'BOYCE, U. S.' read 'BOYCE, J. S.'
200 49 for 'LLOYD, H. B.' read 'LLOYD, A. B.'
277 11 for 'GANJU, P. J.' read 'GANJU, P. L.'
325 36 for '*fructigena*' read '*fructicola*'
355 43 for '**38**' read '**39**'
388 35 for 'IVANOVA, T. V.' read 'IVANOVA, T. M.'
400 3 and 5 for '*pisum*' read '*pisi*'
15 for 'organisms' read 'organs'
464 15 for '*Vakrabeoja*' read '*Vakrabeeja*'
474 37 delete '[*Higginsia hiemalis*]'
482 17 delete '(captan)'
498 26 for 'SARMAH, K. G.' read 'SARMAH, K. C.'
521 10 for '**37**' read '**38**'
536 23 for '*fawcettii* [194]' read '*fawcettii* [125]'
543 12 for 'M. M. RODIGIN' read 'M. N. RODIGIN'
567 35 for 'MORE' read 'MOORE'
594 32 for '*Cephalothecium*' read '*Trichothecium*'
597 41 for '*pseudacacia*' read '*pseudoacacia*'
616 14 for 'NICHOLSON' read 'NICOLSON'
635 23 for 'SHEMAKHANOVA, N. H.' read 'SHEMAKHANOVA', N. M.'
653 33 for 'KALASHNIKOV, K. E.' read 'KALASHNIKOV, K. YU.'
658 38 for '**3**' read '**39**'
737 1 for '*franchettii*' read '*franchetii*'

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Volume 39 · Part 1 · January 1960

REVIEW OF APPLIED MYCOLOGY

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The literature on agricultural insect pests is abstracted in the *Review of Applied Entomology* Series A, and that on plant pathogenic nematodes in *Helminthological Abstracts* Additional references to deficiency diseases will be found in *Soils & Fertilizers*, to plan breeding in relation to disease in *Plant Breeding Abstracts*, and to forestry problems i *Forestry Abstracts*. All these journals except the first are obtainable from Central Sale Dept, Farnham House, Farnham Royal, Bucks. The *Review of Applied Entomology* is sol by the Commonwealth Institute of Entomology, 56 Queen's Gate, London, S.W. 7.

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Review of Applied Mycology

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Literature references in [ ] refer to the *Review of Applied Mycology*.
Map references are to the *C.M.I. Distribution Maps of Plant Diseases*.

Труды Института Микробиологии и Вирусологии. Том 3. [Transactions of the Institute of Microbiology and Virology. Vol. 3.]—213 pp., 5 fig., 9 graphs, Alma-Ata, Academy of Sciences of the Kazakh S.S.R., 1959. Roubles 14.50.

Among the 28 papers in this volume are 2 by G. S. Seĭketov. The 1st (pp. 128–134), on the 'Effect of the microbial complex on the growth and development of potatoes', deals with the dynamics of the development of *Trichoderma* [*viride*] in the soil of the potato rhizosphere, and the 2nd (pp. 134–138) is a study in the use of trichodermin for the control of *Rhizoctonia* [*Corticium solani*] on potato. Satisfactory results were obtained. The prophylactic action of trichodermin on potato tubers and tomato and cabbage seedlings before planting was increased in the presence of *Azotobacter* and *Phosphoritobacter*. E. T. Nikitina (pp. 139–147) reports further work on the role of lucerne before potatoes in the rotation [**38**, 29] for cleansing the soil of *Fusarium oxysporum* var. *solani* [*F. solani*]. The results of further experiments in the use of actinomycetes against *Bacterium* [*Corynebacterium*] *sepedonicum* [**38**, 31] on potato are reported by S. Orŭnbaev (pp. 148–155). Strain 85 (*Actinomyces* [*Streptomyces*] *globisporus-griseus* [series]) stimulated growth and development, while str. 87 (*A.* [*S.*] *rectus*) depressed vegetative growth and lowered yield. Treatment of tubers with str. 85 gave an av. of 13% reduction of infection and prevented spread to new tubers, and also a 7–26% increase in yield depending on the var. and environmental conditions. V. I. Mazunina continuing work (pp. 156–161) on the 'Effect of a culture filtrate of actinomycete strain 1618 on the susceptibility of cabbages to soft rot' found that a culture filtrate of str. 1618 (*A.* [*S.*] *longisporus-ruber* [series]) [**38**, 43] gave effective reduction of *Bacterium carotovorum* [*Erwinia carotovora*] under field conditions, treatment of the roots of seedlings before planting out raising the av. yield 11% and reducing infected plants by 8%. Treatment during head formation, by watering twice with a liquid culture, raised the av. yield 21% and reduced infection 28%. In a paper (pp. 162–165) on 'Actinomycetes antagonistic to *Rhizoctonia* [*Moniliopsis*] *aderholdii*' A. S. Sadŭbekov concludes that they are not uniformly distributed in all types of soil, the largest number occurring in dark-chestnut and chernozem soils. 'Sowing in the open ground as an anti-virus measure in the control of tomato mosaic and streak' by M. I. Gol'din & M. A. Yurchenko (pp. 166–168) has been noticed [**38**, 338]. Also included is 'Experiments in virological analysis of mountain potato stocks in the Alma-Ata region' by M. I. Gol'din & Z. N. Minkenicheva (pp. 169–172).

Bondarenko (M. M.) (Editor). Борьба с вредителями и болезнями сельскохозяйственных растений. [Control of pests and diseases of agricultural plants.] —72 pp., 4 fig., Alma-Ata, Ministry of Agriculture, Kazakh S.S.R., 1958.

This collection includes an article by M. M. Bondarenko (pp. 28–35) on the control

of pests and diseases of vegetables and fruit. Against vascular bacteriosis of cabbage [*Xanthomonas campestris*: **37**, 333] seed treatment with granosan and application of P fertilizers are recommended; against downy mildew [*Peronospora parasitica*: **37**, 612] strict rotation and spraying with S at 30 kg./ha. or with 5% ICO. Onion mildew [*Peronospora destructor*: **37**, 400] is controlled by spraying with 1% Bordeaux 2–3 times at intervals of 15–20 days and bacterial canker of tomato [*Corynebacterium michiganense*: **37**, 332] by dusting the seed with granosan (3 g./kg.).

P. Arkhangel'skiĭ (pp. 36–51) reported that heat treatment has given good control of loose smut of wheat and barley [*Ustilago nuda*: **38**, 591]. Of the chemical measures against wheat bunt [*Tilletia caries*] in different parts of the country formalin gave promising results.

Mme G. N. Kulikova (pp. 52–63) discussed measures for the control of sugar beet diseases, e.g. against black leg [*Pleospora betae*: **38**, 436] rotation with maize and dusting the seed with granosan at 2 kg./ton a few days before sowing, and against leaf spot [*Cercospora beticola*: **38**, 47] (not considered the most damaging disease in the Republic) spraying with Bordeaux at 600–800 l./ha.

Mellors (R. C.) (Editor.) **Analytical cytology**—2nd Edition, 534 pp., numerous text fig., McGraw-Hill Book Co., Inc. (Blakiston Division), New York, Toronto, London, 1959. £6. 15*s*.

Although fungi receive only incidental mention in this well-produced book on methods for studying cellular form and function, mycologists will find of particular interest the chapters on the fluorescent-antibody method for the microscopic identification of bacteria and fungi (by the Editor); phase, interference and polarizing microscopy (by R. Barer); and electron and X-ray microscopy (by Cecily C. Selby and A. Engström, respectively). All the chapters are well documented.

Dreißig Jahre der Züchtungsforschung. [Thirty years of breeding research.]—viii+241 pp., 116 fig., Stuttgart, Gustav Fischer Verlag, 1959. DM. 27. [Numerous ref.]

This well-produced book comprises contributions from the staff of the Erwin Baur Institut, Müncheberg, Germany, describing the activities of the Institute and commemorates Baur's work.

Of interest to plant pathologists is the section (pp. 113–122) by H. Ross, covering parasites and their races, types of resistance, methods of infection and selection, initial breeding material, and the inheritance of resistance, and also detailed notes (pp. 123–222), by various authors, on past and current work with various cultivated plants, with reference to fungal, bacterial, or virus pathogens of barley, wheat, potatoes, tomatoes, gooseberry, red currant, raspberry, strawberry, and vine.

Manual of microbiological methods.—x+315 pp., 4 fig., McGraw-Hill Book Co., Inc., New York, Toronto, London, 1957. 41*s*. 6*d*.

This book by the Society of American Bacteriologists' Committee on Bacteriological Technic replaces the loose-leaf *Manual of methods for pure culture study of bacteria*, 1923–56. It is indispensable for the systematic study of bacteria. There are chapters on staining methods; preparation of media; measurement of pH, titratable acidity, and oxidation reduction potentials; maintenance and preservation of cultures; routine tests for the identification of bacteria; physiological, biochemical, and virological methods.

A. J. Riker and collaborators contribute a chapter on inoculation with bacteria causing plant disease, with particular emphasis on errors of technique and

interpretation. In the section on methods of inoculation brief reference is also made to virus and fungus inoculation into plants.

Sabet (K. A.). **Studies in the bacterial diseases of Sudan crops. III. On the occurrence, host range and taxonomy of the bacteria causing leaf blight diseases of certain leguminous plants.**—*Ann. appl. Biol.*, **47**, 2, pp. 318–331, 1959.

Investigations at the Univ. Khartoum, Republic of the Sudan [cf. **38**, 535], demonstrated that the bacterial leaf blights of *Dolichos lablab*, soybean, cowpea, lucerne (newly recorded for the Sudan), and of 3 spp. of senna (*Cassia* spp.) were caused, respectively, by *Xanthomonas phaseoli*, *X. p.* var. *sojense*, *X. vignicola*, *X. alfalfae*, and *X. cassiae* [**31**, 86]. A comparative study of several strains of these bacteria and of 1 strain each of *X. p.* var. *fuscans* (host unknown), *X. cajani* from pigeon pea, and *X. tamarindi* from *Tamarindus indica* showed they were all indistinguishable by the usual bacteriological procedures. Cross-inoculations demonstrated that their host ranges (except *X. cajani* and *X. tamarindi* which infected only their own hosts) overlapped. If a particular host was infected by more than 1 pathogen the symptoms and effects they produced on that host were similar in all respects, except *X. vignicola*, which produced dry, white mature spots on *Phaseolus vulgaris* and *D. lablab*. Usually infection appeared initially as minute, dark green, rather water-soaked spots which generally developed on all parts.

The systematic position of the pathogens [cf. **35**, 286] was reconsidered and all except *X. p.* var. *fuscans* were proposed as new combinations as special forms of *X. phaseoli*: *X. p.* formae speciales *sojense*, *vignicola*, *alfalfae*, *cassiae*, *cajani*, and *tamarindi*.

Hall (I. M.) & Dunn (P. H.). **The effect of certain insecticides and fungicides on fungi pathogenic to the spotted Alfalfa aphid.**—*J. econ. Ent.*, **52**, 1, pp. 28–29, 1959.

The growth of *Entomophthora exitialis* and *E. virulenta* [see below] in pure culture was inhibited by ferbam (0·25 g./100 l. water), Bordeaux mixture 5–5–50 (0·41), and captan (0·25). Dithane Z-78 (0·25) acted similarly on *E. exitialis* and *E. obscura*, Bordeaux on *E. ignobilis*, and captan on *E. obscura*. *E. exitialis* was suppressed by all the insecticides tested, i.e. parathion at 0·8 ml., malathion (1·5), demeton (0·24), trithion (1·04), and DDT (2·5 g.), the other above-mentioned spp. and *E. coronata* by trithion, and all except the last-named by malathion and demeton. *E. obscura* and *E. ignobilis* were also controlled by DDT. The insecticides did not kill the resting spores of *E. virulenta*, though germination was somewhat retarded.

Hall (I. M.). **The fungus Entomophthora erupta (Dustan) attacking the Black Grass Bug, Irbisia solani (Heidemann) (Hemiptera, Miridae), in California.**—*J. Insect Path.*, **1**, 1, pp. 48–51, 4 fig., 1959.

From the Dept biol. Control, Univ. California, Riverside, it is reported that many adult *I. solani* which appeared in great numbers on the native vegetation in S. California during the winter of 1957–8 were attacked by *E. erupta*, causing typical eruption of the dorsal abdominal segments [cf. **3**, 136].

Soprunov (F. F.). Хищные грибы — Гифомицети и их применение в борьбе с патогенными нематодами. [Predacious fungi — Hyphomycetes and their use in the control of pathogenic nematodes.]—368 pp., 13 fig., Ashkhabad, Akad. Nauk Turkmen. S.S.R., 1958. Roubles 13.70. [Abs. in *Referat. Zh. Biol.*, *1959*, 14, pp. 123–124, 1959.]

This monograph, based on the author's research during a decade, is concerned with the biology and application of predacious hyphomycetes in medicine and agriculture

[cf. **37**, 703]. Details are given of methods of isolation, study, culturing, and the making of a spore preparation. Experiments on the use of hyphomycetes for the control of plant nematodes, and a preliminary experiment on the treatment of an internal focus of ankylostomiasis are described. Excellent results were obtained.

ZANARDI (D.). **Repertorio degli antiparassitari agricoli registrati in Italia.** [List of agricultural antiparasite products registered in Italy.]—*Manuali Fitoiatria* 3, xi+284 pp., Pavia, Società italiana de Fitoiatria, 1959. L. 3,500.

A preliminary section (pp. iii–xi), after an introduction by R. Ciferri, covers the relationship between antiparasite products and human health, the toxicity of such products to bees, their phytotoxicity, and compatibility between them. This is followed by a series of tables of fungicides, insecticides, soil treatments, rodenticides, weed-killers, and various products listed under the principal ingredient and giving the commercial name of the product, the manufacturers, the composition, general use, and method and formulation for usage. There is also a general index.

CIFERRI (R.). **Indice della Guida dei prodotti chimici impiegati come antiparassitari agricoli.** [Index to the Guide to chemical products used for antiparasitic purposes in agriculture.]—80 pp., Pavia, Società italiana di Fitoiatria, 1959. L. 1000.

This publication (1 of the additional Manuali di Fitoiatria of the S.I.F.) is an alphabetically arranged index to the author's 'Guide to chemical products used for antiparasitic purposes in agriculture', published by the Society in separate sheets. Over 3,000 names and symbols are included.

TOWNSEND (G. R.). **Pesticide testing in field trials.**—*Agric. Chemic.*, **14**, 6, pp. 42–44, 122–123, 125, 3 fig., 1959.

This popular note describes stages in the development of new pesticides and briefly outlines the procedure at the Florida Field Trials Sta., Belle Glade [cf. **37**, 699], where a heavy, well-drained muck soil and a long growing season enable field trials to be extended over a much longer period than in the northern states, it being possible, for example, to obtain 2 sets of data on potato blight fungicides at a time when potatoes cannot be grown further north.

Trials of foliar fungicides are concerned in the main with 6 crop-disease complexes, viz. potato blight (*Phytophthora infestans*), early blight of celery (*Cercospora apii*), maize leaf blight (*Helminthosporium turcicum*), leaf diseases of tomato (*P.* [*infestans*], *Stemphylium* [*solani*], and *Alternaria* [*solani*]), cucumber downy mildew (*Pseudoperonospora cubensis*), and crown rust of oats (*Puccinia coronata*), entailing a series of trials running from early autumn to late spring.

MOREAU (C.) & MOREAU (MIREILLE). **Technique simple de comparaison du pouvoir fongicide de diverses substances. Mesure de l'action répressive sur la phase linéaire de croissance.** [A simple technique for comparing the fungicidal power of various substances. Evaluation of the repressive action on the linear phase of growth.]—*Rev. Mycol., Paris*, **24**, 1, pp. 59–64, 1 pl., 1 graph, 2 diag., 1959.

In this method (based on that of Thornberry [**29**, 573]), described from the Laboratoire de Cryptogamie, Muséum National d'Histoire Naturelle, Paris, $\frac{1}{25}$ ml. drops of a 10–0·1% solution or suspension of the substance to be tested are placed symmetrically on the circumference of a 30 mm. diam. circle on each of several Petri dishes, at the centre of which is a 2-day (12 mm. diam.) colony of *Fusarium oxysporum* from oil palm just entering on a phase of linear growth. Two days later the diam. of the colonies are re-measured and the activity of the substance correlated with the decrease in growth compared with the control.

Sharp (R. B.). **Estimation of small amounts of lime sulphur.**—*J. agric. Engng Res.*, **4**, 1, pp. 74–75, 1959.

The principles are explained and directions are given for the application of a method, using N HCl extractant, which has been found to be quantitative for lime-sulphur residues, covering the range 4·8–0·05 μl. of the conc. product.

McKeen (C. D.). **Maneb injury to Tomato and Pepper seedlings grown under glass.** —*Plant Dis. Reptr*, **43**, 7, pp. 729–731, 3 fig., 1959.

It is reported from the Canada Dept Agric., Harrow, Ont., that maneb fungicides, non-phytotoxic in the field, caused considerable damage to tomato and *Capsicum frutescens* under glass. The injury is mainly near the base of the hypocotyl and is worst when seedlings are crowded and drying of the spray is delayed. It is suggested that conditions near the soil may favour a deleterious acid decomposition of maneb [cf. **34**, 738].

Links (J.). **Some remarks on the relative antifungal activities of N-substituted dithiocarbamates. (Short communication).**—*Rec. Trav. chim. Pays-Bas*, **77**, pp. 1043–1047, 1958.

Van der Kerk and Klöpping's hypothesis explaining the relative toxicities to fungi of the lower N-substituted dithiocarbamates by hyperconjugation [**34**, 47] is critically discussed and an alternative theory proposed in this paper from the Univ. Amsterdam. On the basis of Jansen's determination of the 1st and 2nd stability constants of several Cu N-dialkyldithiocarbamates in 75% ethanol-water (*Rec. Trav. chim. Pays-Bas*, **75**, p. 1411, 1956), the opt. activity of the 1:1 Cu dithiocarbamate complex is tentatively attributed to a certain degree of complex-forming ability (no alkyl < dimethyl < diethyl < di-*n*-propyl) with corresponding chemical stability of the dithiocarbamyl compound in solution, together with a measure of permeability through a plasma membrane (no alkyl > dimethyl > diethyl > di-*n*-propyl).

Taylor (G. G.). **New power take-off Turbo mist for smaller orchards.**— *Orchard. N.Z.*, **32**, 5, pp. 125–126, 1959.

This machine has been developed to enable the small farmer to use his tractor for both pulling the sprayer and powering the pump, thereby avoiding the expense of maintaining a separate engine. It is essentially a semi-concentrate sprayer, but provision has been made for dilute spraying where required. To meet all requirements either a Ronaldson Tippett pump (capacity 8·4 Imperial gal./min.) is used, or a Myers pump (13 American gal. min.). Attention has been given to the question of double and single side spraying, as it is appreciated that there are occasions, as where wind velocity is high or trees large, when it is best to employ all the air to one side. Provision is made for this by an adjustment permitting the fishtail to be doubled in aperture during single-sided spraying. Spraying with this type of machine requires that the engine speed of the tractor be kept constant, which means that the speed of travel cannot be varied as it can where sprayers with separate engines are used. This difficulty has been met by designing particular machines for particular tractors, so that opt. performance is secured. Tests have demonstrated that quite small tractors, e.g. the Ferguson TE 20, are capable of operating the sprayer on reasonably steep slopes, and it is stated, incidentally, that in tests of Turbo mist spraying over several years at the Horticulture Division, Te Kauwhata Res. Sta., pests and diseases of grapes have been controlled with considerable success. A special fishtail designed for use on grape vines has fewer nozzles, enabling about 30 gal./acre to be used. There is considerable saving in spray material and the machine is thus both economic and efficient.

Wessel (C. J.) & Bejuki (W. M.). **Industrial fungicides.**—*Industr. Engng Chem.*, **51**, 4, pp. 52A–63A, 1 fig., 1959. [27 ref.]

Some striking examples are contained in this useful survey from the Prevention of Deterioration Center, Nat. Res. Council, Washington, D.C., of the drain on the national economy resulting from the destructive action of micro-organisms, e.g. in the U.S. Army, the mining industry, paper mills, and homes, and on railways. Among other materials requiring preservation are textile and cordage fibres, leather, plastics, electrical and photographic equipment, paints, and fishing gear. The annual market potential for industrial fungicides in U.S.A. is estimated at $60,000,000. The paper concludes with 3 tables, (1) containing a list of products available in 1959 arranged in chemical groups, (2) an alphabetical list of manufacturers and suppliers, and (3) an alphabetical list of industrial fungicides.

Petrova-Zavgorodnyaya (Mme A. P.) & Érastov (D. P.). Определение зараженности бумаги плесневыми грибами при помощи люминесценции. [Determination of mould contamination of paper by luminescence.]—*Bull. Acad. Sci. U.S.S.R.*, Ser. biol., *1959*, 3, pp. 403–411, 6 fig., 1 graph, 1959. [Engl. summ.].

In these studies at the Lab. for the Conservation and Restoration of Documents, U.S.S.R. Acad. Sci., pieces of newspaper, rag paper, printed paper No. 1, and filter paper (8 × 1 cm.) were sterilized in test tubes in neutral Van Iterson mineral medium and inoculated with a fungus culture. At neutrality the medium is inert. The pieces were examined daily for a month and then every 10 days under monochromatic irradiation (max. at 436, 405, 365, and 313 mμ). Mould foci could be detected only with max. at 365 and 313 mμ. At 313 mμ the earlier stages of contamination were revealed, when the luminescence colour is more saturated. Moulds with a colourless mycelium are strongly luminescent. In the initial stage of contamination *Chaetomium affine* [cf. **35**, 534], for example, luminesces grey and later brilliant cornflower blue, perithecia being initially brown and subsequently black; pigmentation is olive yellow. Similarly, *Fusarium moniliforme* [*Gibberella fujikuroi*] shows initially light yellow, then brilliant canary yellow; *Sporotrichum bombycinum* shows cream then violet; and *Tricothecium roseum* light blue then orange-pink. When moulds with coloured mycelium or conidia are exposed to ultra-violet, the colour exhibited is at first close to the natural one (*Monilia* [*Neurospora*] *sitophila*, *Aspergillus fumigatus*, *Macrosporium* sp., etc.). A colour atlas of mould luminescences with adequate qualitative differentiation can be produced by colour photography, which would facilitate rapid identification of foci of moulds in documents.

Brewer (D.). **Studies on slime accumulations in pulp and paper mills. III. The stimulation of growth by 'white water'.**—*Canad. J. Bot.*, **37**, 4, pp. 517–521, 1959.

Further studies [cf. **38**, 635] have shown that while the recirculated process water from a pulp and paper mill cannot support growth of fungi isolated from such mills, yet when added to a basal medium that does, it has a stimulatory effect. At least 2 stimulatory substances were demonstrated, one acting on *Phialophora fastigiata* and the other on *Phoma* sp. It is suggested that they may originate in the wood [cf. Robbins *et al.*, **38**, 395].

Hentschel (A. J.). **Bactericidal, fungicidal, and insecticidal papers.**—*Zellstoff u. Papier*, **8**, 1, pp. 9–13, 1959. [Germ. Abs. in *Bull. Inst. Pap. Chem.*, **29**, 9, p. 1326, 1959.]

Bacteria, fungi, and other organisms attacking paper are listed and their relation to slime formation in paper pulp and paper machine water systems explained.

Mention is made of the technical and safety factors concerned in the selection of biocides and in the application of sterilizing radiations. Preservatives most frequently considered include salicylic, dehydroacetic, and sorbic acids; organic metal compounds, e.g. tributyl tin hydroxide, silver cacodylate, Cu 8-quinolinolate, 8-quinolinol methyl arsenate, and 8-quinolinol arsanilate; pentachlorophenol, its Cu and Na salts, *o*-phenylphenol, and other phenol derivatives; alkyldimethylbenzyl ammonium chloride and other quaternary NH_4 compounds; and miscellaneous preparations, such as the French 'fongium' (3,5-dimethyl-4, 6-tetrahydro-1,3, 5-thiodiazine-2-thione).

Moritz (K.). **Elimination of mildewed and moist surfaces in paper mills.** *Wbl. Papierfabr.*, **87**, 3, pp. 84–85, 1959. [Germ. Abs. in *Bull. Inst. Pap. Chem.*, **29**, 9, p. 1329, 1959.]

Vapour diffusion through building walls, leading to moisture condensation, is stated to be the primary cause of damage from blistering, frost, and mildew [of unspecified origin]. Preventive measures should therefore be concentrated on the provision of adequate moisture barriers and thermal insulation. Among the materials proposed are fibre board, particle board, excelsior and styropor foam panels, and related insulating boards, e.g. vaporex, an elastic vapour barrier laminated on both sides to paper.

Holderby (J. M.) & Moggio (W. A.). **The production of nutritional yeast from spent sulfite liquor.** *For. Prod. J.*, **9**, 6, pp. 21A–24A, 5 fig., 1959.

A description is given of the methods developed in the U.S.A. for the cultivation of yeasts, in particular *Candida utilis*, on spent sulphite liquor from paper pulp mills, a product so far treated as waste. The economic status of the process is discussed.

Klinkowski (M.). **Virosen und Pflanzenquarantäne.** [Viruses and plant quarantine.]—*NachrBl. dtsch. PflSchDienst. Berl.*, N.F. **13**, 3, pp. 41–46, 1959. [Russ., Engl. summ.]

In this paper delivered in Aug. 1958 at the plenary session of the IX International Congress for Plant Protection and Plant Quarantine, Moscow, the author discusses quarantine measures in relation to virus diseases and possible procedures. The length of time usually required for diagnosis is the main obstacle. Specific regulations of individual countries are listed. The testing of perennials, especially trees, in quarantine nurseries before release is recommended and a shorter version of this measure is proposed for some annuals. Details are given of some restrictions on the import of fruit trees, as well as of *Rubus* and *Fragaria*, suggested for the German Democratic Republic.

Bergman (H. F.). **Oxygen deficiency as a cause of disease in plants.**—*Bot. Rev.*, **25**, 3, pp. 418–485, 1959. [235 ref.]

In this very useful review the subject is discussed under the headings: diseases caused by reduction in O supply to roots, deficient air supply to roots in relation to infection by pathogenic organisms, diseases caused by lack of O supply to parts other than roots, factors to which occurrence of disease is attributed, effects of reduced O supply on physiological processes, effects of products formed in anaerobic respiration, factors affecting air supply to roots, variation in ability of plants to withstand reduced O supply, and means by which plants are able to withstand reduced O supply to roots or other parts.

Darling (W. M.) & McArdle (Maura). **Effect of inoculum dilution on spore germination and sporeling growth in a mutant strain of Aspergillus amstelodami.**—*Trans. Brit. mycol. Soc.*, **42**, 2, pp. 235–242, 1 pl., 1 fig., 1959. [16 ref.]

At Queen's Univ., Belfast, a mutant strain of *A. amstelodami*, with slow germination

and poor linear growth, and more especially lack of branching, grew slowly or not at all in single-spore cultures on media which supported rapid growth from heavy inocula. Germination of both conidia and ascospores was similarly affected. If, however, a conc. inoculum was placed on a cellophane disk on the surface of the medium, and the disk removed after a day or two and replaced by a single spore in the area so 'primed', normal germination and growth took place. Slow-starting colonies on unprimed media eventually caught up with those on primed. Addition of CO_2 to the atmosphere [cf. **2**, 24] markedly stimulated branching of existing hyphae, though not affecting germination or linear growth rate.

As a possible explanation of this phenomenon it is suggested that the mutant strain has a defect in whatever primary oxidative process supplies the energy and basic materials for synthesis and growth; some substance of small molecular size (and hence easily diffusable in the medium), which either acts as a catalyst or is a necessary part or precursor of a complex catalytic system, is lacking, though not completely so, some synthesis being possible. It is considered that CO_2 is necessary for a secondary chain of synthesis responsible for branching.

Bilgrami (K. S.) & Tandon (R. N.). **The assimilation of sugars by three pathogenic species of Phyllosticta.**—*Proc. Indian Acad. Sci.*, Sect. B, **27**, 4, pp. 196–203, 1957. [*Biol. Abstr.*, **33**, 10, p. 3202, 1959.]

At Allahabad Univ. *P. carica-papayae* from papaw, *P. mortonii* from mango, and *P. morifolia* from mulberry hydrolysed maltose and sucrose before assimilation [cf. **37**, 213]; maltose was a better source than its hydrolytic product glucose, while sucrose and a mixture of glucose and fructose were almost equal. Melibiose was hydrolyzed by the 1st 2 spp. only. Raffinose, lactose, and cellobiose were poor sources, though their hydrolytic products supported very good growth of all 3 fungi. Maltotriose was synthesized from maltose. Glucose and galactose were the best sources among the hexoses.

Katsura (K.) & Takahashi (H.). **Effect of nitrogen sources upon the mycelial growth and sporulation of the fungus Phytophthora capsici Leonian.**—*Sci. Rep. Fac. Agric. Saikyo Univ.* 10, pp. 86–92, 1958. [Jap. Abs. from Engl. summ. Received 1959.]

P. capsici [**35**, 915], the causal agent of a blight and rot of Solanaceae and Cucurbitaceae, was shown to utilize nitrates, but not ammonium salts, probably owing to the fall of pH in the medium. L-asparagine and glycine were much better than nitrates, peptone, and DL-alanine; L-aspartic acid, urea, ammonia, and L-glutamic acid inferior to nitrates; and L-leucine useless. For zoosporangial formation on agar media L-asparagine, glycine, L-aspartic acid, L-arginine, KNO_3, and peptone were adequate. The mycelium formed swellings plentifully in cultures containing peptone, urea, NH_4Cl, or $(NH_4)_2SO_4$.

Katsura (K.) & Nishioka (M.). **Effect of carbon sources upon the mycelial growth and sporulation of the fungus Phytophthora capsici Leonian.**—*Sci. Rep. Fac. Agric. Saikyo Univ.* 10, pp. 93–99, 1 fig., 1958. [Jap. Abs. from Engl. summ. Received 1959.]

In this investigation [cf. above] the basal medium was Mehrotra's solution (0·5 g. KH_2PO_4, 0·5 g. K_2SO_4, 0·5 g. $MgCl_2$ $6H_2O$, 2 g. NH_4NO_3, 2,000 international u. thiamine, 1,000 ml. distilled water). The addition of glucose, fructose, or sucrose gave satisfactory growth, but that of xylose, galactose, maltose, lactose, soluble starch, or glycerin did not. Arabinose, mannite, and ethyleneglycol gave poor growth. The best sporangial formation was on an agar medium containing lactose, followed in order by arabinose, xylose, maltose, soluble starch, and manite; but it was poor with galactose and glycerin. Glucose, fructose, and sucrose induced

sporangial formation in solid but not in liquid media. No oospores developed in any of the media.

Toyama (N.). **Cellulolytic activities of Trichoderma koningi and their application.** —*Bull. Fac. Agric. Miyazaki Univ.*, **33**. 12, pp. 40–58, 1 fig., 3 graphs, 1958. [Received Aug. 1959.]

In experiments on the cellulolytic action of *T. koningi* [*T. viride*] the activity of the cellulolytic enzymes was stronger in surface culture than in submerged. Such enzymes were liberated only in the presence of cellulose, cotton being more suitable than other sources, including rayon and filter paper. Cell-free enzyme preparations were obtained by precipitation with ethanol and ammonium sulphate. Wheat bran cultures of the fungus had a very high cellulase and amylase activity, the latter saccharifying imbibed sweet potato pulp to give 5–8% reduced sugar at pH 5 and 40° C. in 24–96 hr. Wheat bran and sawdust cultures were used to saccharify various cellulosic wastes; wastes pretreated with diluted acid and alkaline solution gave 1–1·5% reducing sugar, mainly glucose, in 24 hr. at 45°, and when such wheat bran and sawdust cultures were incubated with water the reducing sugar increased slowly up to 2% after 48 hr.

Koch (W.). **Untersuchungen über Mycelwachstum und Fruchtkörperbildung bei einigen Basidiomyceten (Polystictus versicolor, Polyporus annosus, Pleurotus ostreatus und Psalliota bispora).** [Studies on mycelial growth and fruit body formation in some Basidiomycetes (*P. versicolor*, *Fomes annosus*, *Pleurotus ostreatus*, and *Agaricus bisporus*).]—*Arch. Mikrobiol.*, **30**. 4, pp. 409–432, 2 fig., 7 graphs, 1958.

At the Pflanzenphysiologisches Institut, Univ. Göttingen, Germany, *Polystictus versicolor* produced fruit bodies [cf. **23**. 157] after 21 days on a synthetic medium containing glucose, alanine, mineral salts, and aneurin [vitamin B_1]. Other appropriate C sources included fructose and glycerin, while N was supplied by NH_4Cl, NH_4 tartrate, arginine, asparagine, glutaminic acid, and asparginic acid. Light (at least 1,000 lux for 8 hr. daily) proved essential for normal fruit body development, though abnormal ones were readily formed in total darkness.

F. annosus did not fruit under any of the cultural conditions provided.

Pleurotus ostreatus produced carpophores after 40–150 days on a medium containing cellulose, peptone, salts, and vitamin B_1, 14 hr. light (4,000–8,000 lux) being essential for normal development.

A. bisporus [cf. **37**. 66] fruited on autoclaved horse dung and on sterile loess loam over sterile horse dung. Rudimentary fruit bodies were also formed on dung agar covered with loess loam but none on synthetic media. Mycelial growth was inhibited by light.

Robbins (W. J.) & Hervey (Annette). **Light, growth, and reproduction of Poria ambigua.**—Abs. in *Science*, **129**, 3358, p. 1288, 1959.

Studies at the Botanical Garden, New York, showed that *P. ambigua* [**16**, 6] does not form a hymenium and basidiospores on a basal agar medium containing dextrose, mineral salts, B vitamins, purine and pyrimidine bases, and casein hydrolyzate unless exposed to light (blue end). Short exposures to weak light are adequate and persist, which suggests that a substance produced in the light moves into mycelium formed later in the dark and induces reproduction. Substances which increase growth interfere with reproduction, whereas actidione, a growth inhibitor, permits hymenium formation. Probably 3 (unidentified) growth substances are concerned: *x*, formed in the light and necessary for the physiological and morphological changes resulting in reproduction; *y*, limiting growth on the basal medium is synthesized by the fungus and is found in natural substances; *z*, the synthesis of

which is favoured by light, limits growth in the dark in the presence of luxus amounts of *y*.

Barnett (H. L.) & Lilly (V. G.). **The use of fungus parasites in basic studies of parasitism.** Abs. in *Proc. W. Va Acad. Sci.*, **30** (*1958*), p. 143, 1959.

Following studies of the mode of parasitism, host range, and effects of host nutrition on the hyperparasites *Piptocephalis* spp. and *Calcarisporium parasiticum* [**38**, 133] it is concluded that in general host susceptibility is increased by a medium high in N, and resistance by high sugar conc. *C. parasiticum* parasitizes [loc. cit.] *Physalospora glandicola*, *P. ilicis*, *Botryosphaeria ribis*, *Guignardia bidwellii*, and *Diplodia pinea*. Host hyphae show positive tropism towards spores of the parasite germinating nearby. The parasite makes close contact with the host hyphae, but does not penetrate them. The growth rate of the host fungus is reduced. Autoclaved aqueous extracts of the mycelium of susceptible hosts and of closely related immune spp. were equally effective in inducing slow abnormal growth of *C. parasiticum* in pure culture.

Stowe (B. B.) & Yamaki (T.). **Gibberellins : stimulants of plant growth.**—*Science*, **129**, 3352, pp. 807–816, 9 fig., 1959. [156 ref.]

This useful and interesting review [cf. **38**, 130] covers the historical background, chemistry, effects on different aspects of plant growth, and application to theoretical problems.

Estienne (V.). **Que penser des antibiotiques en phytopharmacie?** [What to think of antibiotics in phytopharmacy?]—*Agricultura, Louvain*, Sér. 2, **7**, 1, pp. 61–83, 1959. [Flem., Engl. summ.]

This informative survey of work during the past 7 yr. comprises lists of antibiotics, arranged according to their origin from moulds, streptomycetes, or bacteria, followed by observations on their performance in laboratory and field experiments in various countries. Among those tested on a commercial scale, streptomycin, agrimycin, actidione, and griseofulvin are regarded as promising, especially as seed disinfectants and against bacterial and fungal diseases of plants. At present, however, their employment is impracticable on economic grounds.

Ross (J. P.). **The effect of the polyene antibiotic fungichromin on the free and combined amino acids of Verticillium albo-atrum.**—*Phytopathology*, **49**, 7, pp. 422–425, 1 diag., 1959.

At Cornell Univ., Ithaca, it was shown that on exposure to 10 and 30 p.p.m. fungichromin the mycelium of *V. alboatrum* lost all soluble amino acids and the composition of the bulk protein of the mycelium was noticeably altered with regard to glutamic acid, threonine, alanine, lysine, arginine, and phenylalanine. Such results were not caused at 2 p.p.m. which did not reduce fungal growth, but there was a marked change in the relative composition of the hyphal free amino acid pool; the leucines, arginine, lysine, and in particular proline were much increased and the total soluble N of the fungus was 3 times as great as in the absence of fungichromin.

Suzuki (Y.). **Studies on the metabolic products of Ditiola nuda. I. On the antibiotic substance.**—*Nagaoa*, **6**, pp. 35–43, 3 fig., 1959.

A new antibiotic isolated from cultures of *D. nuda* at the Nagao Inst., Tokyo, completely inhibited some moulds, including *Aspergillus oryzae* and *Fusarium moniliforme* [*Gibberella fujikuroi*], and yeasts, and slightly some bacteria and *Streptomyces griseus*. Its properties are detailed.

Abdullaeva (Mme A. A.). Фитонцидные свойства летучих фракций и соков афлатунского Лука и местного Чеснока. [Phytoncidal properties of volatile fractions and saps of the aphlatunse Onion and local Garlic.]—Докл. АНУзССР [*Dokl. AN Uz. S.S.R.*], *1959*, 1, pp. 43–45, 1959. [Uzbek summ.]

At the bot. Inst., Tashkent, Uz. S.S.R., in 1957, 400 plants were tested for their phytoncidal properties [cf. **38**, 628]. Only 2, *Allium aphlatunse* and garlic, were outstanding for their high activity against *Pseudomonas* [*Xanthomonas*] *malvacearum*, *Fusarium* [*oxysporum* f.] *vasinfectum*, *Verticillium dahliae*, and *Rhizoctonia* sp. Tests at all stages of development of the 2 spp. demonstrated that activity does not vary. All cultures treated *in vitro* with paste or powder of onion or garlic died. The most susceptible was *F. o.* f. *vasinfectum*, followed by *V. dahliae*. Garlic was stronger than onion. Volatile fractions and sap from the buds and flowers were the strongest. In drying both plants lose much of their phytoncidal properties, being reduced to $\frac{1}{10}$ in dry garlic.

Martin (J. P.), Ervin (J. O.), & Shepherd (R. A.). **Decomposition and aggregating effect of fungus cell material in soil.**—*Proc. Soil Sci. Soc. Amer.*, **23**, 3, pp. 217–220, 1959.

At the Citrus Exp. Sta., Riverside [cf. **37**, 235; **38**, 4], plant and fungus residues decomposed in the following order in sandy loam soil, taking CO_2 evolution during incubation as a criterion: light-coloured fungi, including *Aspergillus sulphureus*, *A. versicolor*, *Cylindrocarpon radicicola*, *Epicoccum purpurascens* [*E. nigrum*], *Fusarium solani*, *Myrothecium verrucaria*, *Penicillium nigricans*, *P. vinaceum*, *Scopulariopsis brevicaule*, *Sepedonium chrysospermum*, and *Volutella* sp. > dark-coloured spp. represented, e.g. by *Acrotheca* sp., *Acrothecium robustum*, *Cladosporium herbarum*, *Diplodina* sp., *Gliomastrix convoluta*, *Helminthosporium* sp., *Hormodendrum* [*Cladosporium*] *cladosporioides*, *H. pallidum*, *Phaeoscopulariopsis* sp., *Pullularia pullulans*, *Pyrenochaeta* sp., *Stachybotrys atra*, *Stemphylium consortiale*, and *Stysanus stemonites* = benzene-alcohol-extracted light-coloured spp. > plant residues > benzene-alcohol-extracted dark-coloured spp. After 4 weeks about 34% of the dark-coloured and 43% of the light-coloured fungus material had been mineralized, while the av. plant residue decomposition was 38%.

The ether-soluble mycelial components exerted a much stronger binding action than the plant or whole fungus residues. Pure cultures of *E. nigrum* with sucrose or grass as a C source were outstanding in aggregating effect, causing an increase from 31 to 77% after 20 days' incubation, while other effective spp. were *Aspergillus versicolor*, *V.* sp., *D.* sp., *Pyrenochaeta* sp., *Stachybotrys atra*, and *Stemphylium consortiale*. A marked binding action on the soil was also exercised by a metabolic substance (very resistant to decomposition) synthesized by *E. nigrum*, crude polysaccharides from *Phaeoscopulariopsis* sp. and *Acrotheca* sp., and the alcohol-soluble constituents of *Stachybotrys atra*. Methyl-soluble material from *Pullularia pullulans* decomposed readily but caused little aggregation.

Chalvignac (M. A.), Tysset (C.), & Pochon (J.). **Action de la truffe (Tuber melanosporum) sur la microflore tellurique.** [Action of the truffle (*T. melanosporum*) on the soil microflora.] *Ann. Inst. Pasteur*, **96**, 3, pp. 355–358, 1 graph, 1959. [Engl. summ.]

A study of soil samples collected in the region of Quercy, S.W. France, revealed a significant decrease in microbiological activity in the areas occupied by *T. melanosporum* [**12**, 198], involving the total population and more specifically nearly all the groups concerned in the N and C cycles. The reduction may be attributed to either the exertion of a direct inhibitory influence by the truffle or the absence of a rhizosphere effect, since the zones where it grows are totally devoid of vegetation.

Ivanov (P.). Обеззаразяване на парниковата почва. [Disinfection of glasshouse soil.]—Градинарство [*Gradinarstvo*], **1**, 1, pp. 19–22, 1959.

Recommendations by the Min. Agric., Sofia, Bulgaria, include watering the soil to a depth of 10–20 cm. with a solution of 2 l. formalin/100 l. water (at 10 l./sq. m.) 2 weeks before sowing or with germisan wet at 250 g./100 l. water (at the same rate), or dusting with germisan dry (at 80 g./sq. m.), and raking in. All gave very satisfactory control of leaf mould [*Cladosporium fulvum*], *Verticillium* wilt [*V. albo-atrum*], and tumours [*Agrobacterium tumefaciens*] on tomato, gummosis [*Cladosporium cucumerinum*] and grey mould [*Botrytis cinerea*] on cucumber, and clubroot [*Plasmodiophora brassicae*] on cabbage. On several State farms the new Soviet method by which the soil is given a thorough soaking, all possible cracks being closed, and left for 5 days of sun after the temp. reaches 45° [C.] has given very good results, especially in checking fungus diseases.

Kalýmbetov (B. K.). Микофлора Алма-Атинского ботанического сада Академии наук Казахской ССР. [The fungus flora of the Alma-Ata Botanical Garden, Academy of Sciences, Kazakh S.S.R.]—Труд. Алма-Атин. бот. Сада [*Trud. Alma-Ata bot. Sad.*], *1959*, 4, pp. 125–141, 1 fig., 1959. [28 ref.]

This annotated list, arranged systematically, includes *Pseudopeziza medicaginis* on lucerne [map 129], *Uromyces fabae* [map 200] on *Vicia tenuifolia*, *Puccinia asparagi* [map 216] on *Asparagus* sp., *P. cichorii* on chicory, *Septoria cannabis* on hemp (*Cannabis sativa*), and *Cercospora fragariae* on *Fragaria grandiflora*.

Buchwald (N. F.). **Bidrag til Bornholms Svampeflora.** [Contribution to the fungus flora of Bornholm.]—Reprinted from *Jubilaeumsskr. Bornholms naturhist. Foren., 1957*, 16 pp., 3 fig., 1957. [20 ref. Received Aug. 1959.]

This critically annotated list contains 119 records, including a number not in the catalogues of Neger and Rostrup (*Bot. Tidsskr.*, **27**, pp. 361–370, 371–379, 1906). Among them are *Cordyceps capitata* and *C. ophioglossoides* (*C. parasitica*) on *Elaphomyces granulatus*; *Xylaria polymorpha* on beech; *Gnomonia pseudoplatani* on *Acer pseudoplatanus*; *Venturia aucupariae* on *Sorbus aucuparia*; *Puccinia arrhenatheri* on barberry; *P. graminis* f. sp. *tritici* on wheat; *P. hordei* on barley; *Stereum purpureum* on beech; *S. sanguinolentum* on spruce; *Coniophora puteana* on conifers; *Schizophyllum commune* on birch; and a number of Polyporaceae and agarics.

New hosts of *P. graminis* are *Alopecurus myosuroides* (*A. agrostis*) and *Deschampsia flexuosa*.

Tóth (S.). **A Kárpátmedence Nectriafajai.** [*Nectria* spp. in the Carpathian basin.] —*Bp. Tud. biol. Int. Évk.*, **1**, 1, pp. 148–188, 10 graphs, 1950. [3 pp. ref. Russ., Germ. summ. Received 1959.]

The 1st part of this paper deals with the historical data on the genus and systematic characters [cf. **36**, 729]. The 2nd part consists of a spp. list, concluding with investigation into the origin of *N. solani* in the Carpathian basin. The author considers *Fusarium solani* to be distinct from *N. solani*.

Savile (D. B. O.). **Notes on Exobasidium.**—*Canad. J. Bot.*, **37**, 4, pp. 641–656, 12 fig., 1 diag., 1959.

A general discussion of the biology, taxonomy, and host relationships is presented from the Canada Dept Agric., Ottawa, together with a key, detailed descriptions, and host records of 7 spp. and 3 vars., including *E. vaccinii* [cf. **37**, 207, 727], 3 spp. nov., 2 var. nov., and 1 comb. nov.

Bondartsev (A. S.). О систематическом положении некоторых родов и видов **Polyporaceae s. str.** [On the systematic position of some genera and species of

the Polyporaceae s. str.]—*Bot. Zh. S.S.S.R.*, **44**, 4, pp. 447–456, 5 fig., 1959. [Engl. summ.]

In this paper from the V. L. Komarov bot. Inst., Leningrad, the author [cf. **36**, 669] concludes that there are inadequate grounds for distinguishing between the *Chaetoporus* and *Chaetoporellus*, and they are united under the former. The problem of distinguishing between *Poria* and *Amyloporia* is discussed, but merging is considered premature. *Coriolopsis* (*Lenzites*) *trabea* is considered to be inappropriately placed as the only European representative of this American genus; the author accepts the binomial *Gloeophyllum trabeum*, and provides a supplementary full description. *Anisomyces* is reviewed and rejected in favour of *Osmoporus*. *O. odoratus* and *O. protractus* (for *Trametes protracta*) are considered in detail.

Bonner (J. T.). **The cellular slime molds.**—vii + 150 pp., 8 pl., 13 fig., Princeton University Press, 1959. $4. 32*s*.

This welcome book briefly summarizes present knowledge of the Acrasiales with special emphasis on the mechanics of development. The author discusses the relation of cellular slime molds to other organisms, the structure and life histories of the various cellular slime molds, and the experimental work done on the subject. In conclusion there is a virtually complete bibliography for the group.

Liang (S.-F.), Tsia (J.-S.), Shen (L.-C.), & Kuryłowicz (W.). **Zastosowanie metod immunologicznych i immunochemicznych do identyfikacji i klasyfikacji gatunków rodzaju Streptomyces.** [The use of immunological and immunochemical methods for the identification and classification of species of the genus *Streptomyces*.]—*Med. dośw. mikrobiol.*, **10**, 1, pp. 91–103, 1958. [Abs. in *Referat. Zh. Biol., 1959*, 11, p. 72, 1959. Russ., Engl. summ.]

Immunological reactions in actinomycetes are weaker than those in bacteria. Antigenic polysaccharide fractions of *S. griseus*, *S. rimsosus*, and other spp., consisting of glucosamine, glucose, and arabinose, possess serological specificity. From the immunological point of view they are haptogens and mild antigens *in vitro*. Related strains can be identified by means of serological methods.

Rusakov (L. F.) & Zvyagintseva (Mme E. I.). Селекция сельскохозяйственных культур на иммунитет — один из резервов повышения урожайности. [Selection of agricultural crops for immunity- a further means of raising yield.]—Селек. Семеновод. [*Selek. Semenovod.*], **24**, 2, pp. 15–18, 1959.

The authors give a general review of some of the new varieties produced by scientific research institutes in the Soviet Union, particularly cereals, bred for immunity from fungus diseases. Hybridization is the most effective method.

Lougheed (T. C.). **An apparatus for the growth of fungi on media of constant composition.**—*Canad. J. Bot.*, **37**, 4, pp. 493–498, 3 fig., 1959.

This apparatus, described from the Lab. Insect Path., Sault Ste. Marie, Ont., was used for culturing *Hirsutella ?gigantea* [**38**, 384]. The fungus was grown on glass fibre filter paper supported on woven nylon in a growth cell, and a constant flow (approx. 3 ml./hr.) of medium was supplied to the underside of the membrane by means of an inlet valve and kept automatically stirred. An overflow regulator was adjusted to keep the surface of the medium just in contact with the membrane. Analysis of the used medium enabled the nutrition of the fungus to be studied. The membrane serves in lieu of a natural surface mat of mycelium, which is not readily formed by this fungus on liquid media.

MacLeod (D. M.). **Nutritional studies on the genus Hirsutella. 1. Growth response in an enriched liquid medium.**—*Canad. J. Bot.*, **37**, 4, pp. 695–714, 3 pl., 5 graphs, 1959. [58 ref.]

Quantitative studies at the Lab. Insect Path., Sault Ste. Marie, Ont. [see above],

showed that the growth rate and total yield of *H. gigantea* grown in a shaken yeast extract dextrose medium (1·5:2%) was correlated with the amount of inoculum, 0·2–0·4 mg./50 ml. being opt. (673·4 mg. mycelium after 12 days) and giving a uniformity lacking with 0·1 mg. or less of inoculum. Increase above the opt. gives a higher growth rate but a gradual decrease in total yield.

The fungus does not grow in a basal dextrose salts medium with KNO_3 or NH_4NO_3 as the N source and the effectiveness of yeast extract (which may also provide growth factors) shows a need for organic N.

Hammond (J. B.) & Barnett (H. L.). **Survival of frozen aqueous spore suspensions of fungi.**—Abs. in *Proc. W. Va Acad. Sci.*, **29** (*1957*), p. 15, 1959.

Further results are presented of an experiment started in 1950 [**33**, 46]. After 3 and 4 yr. spores of 13 of the 21 spp. remained viable, and after 7 yr. spores of 6 spp., viz. *Endothia parasitica*, *Schizothecium longecolle*, *Penicillium spiculosporum*, *Aspergillus repens*, *A. rugulosus* [cf. **38**, 399], and *Sordaria fimicola*. Spores of *Gliocladium* sp. and *P. expansum* frozen in 1952 were viable in 1957.

Klotz (L. J.) & DeWolfe (T. A.). **A technique for determining the fungicidal value of various treatments against Phytophthora spp.**—*Plant Dis. Reptr*, **43**, 7, p. 833, 1959.

At the Univ. Calif. Citrus Exp. Sta., Riverside, to test lethal temp. effects suspensions of zoospores of *P.* spp. in capillary tubes are exposed in water baths and then blown into a hole in an apple, the plug removed to make it being replaced. Viable spores produce a rot within a week. To assay toxicity of chemicals, where a complete kill is sought, similar spore suspensions are mixed with an equal vol. of the fungicide on a glass slide and after the required period of exposure are washed into an apple in the same way.

Kristova (Eleonora). Цветята и вирусните заболявания по зеленчуците. Още за цветята и вирусните заболявания по зеленчуците. [Flowers and virus diseases of vegetables. More on flowers and virus diseases of vegetables.]—Градинарство [*Gradinarstvo*], **1**, 3, pp. 29–31, 2 fig.; 4, pp. 21–25, 5 fig., 1959.

Virus diseases of vegetables in Bulgaria have increased since the introduction and expansion of flower growing on the same farms. Examples are given of flowers as hosts of tomato spotted wilt virus and the symptoms of infection; such plants should not be grown near tomato fields.

In the 2nd paper flower hosts of cucumber mosaic virus are listed. All infected bulbs of *Lilium* spp. should be destroyed. Tomato big bud virus, transmitted by *Hyalesthes obsoletus*, severely damaged asters at Botevgrad State farm. Tobacco mosaic virus attacks petunia and tobacco. Pea mosaic virus, transmitted by *Myzus persicae* and *Aphis rumicis*, was severe on sweet peas in the German district and infected plants bore no seed.

Rŷzhkov (V. L.). Азотное питание вирусов. [The nitrogen nutrition of viruses.]—Воп. Вирусол. [*Vop. Virusol.*], *1959*, 3, pp. 259–265, 1959. [59 ref.]

From a review of the literature the author concludes that viruses satisfy their nutritive requirements, like parasitic oganisms, from comparatively low molecular compounds which vary according to the virus. The emergence of biochemical mutants can be observed experimentally. Further study of the conditions of virus nutrition is of great value for the rational planning of research on chemicotherapeutic preparations. The data given show that in some circumstances the requirements of the viruses differ qualitatively from those of the tissues in which they grow. This opens up the possibility of discovering antimetabolites capable of inhibiting virus reproduction without significantly affecting the cells of the host.

Even now there are grounds for testing various amino acids, though not their more toxic analogues, for the treatment of virus diseases. Of special importance is the study of virus reproduction in tissue cultures, especially the physiological aspects.

Nagaich (B. B.). **Effect of Tomato virus on infection of Bean plants by Tobacco mosaic virus.**—*Indian J. agric. Sci.*, **28**, 4, pp. 563–566, 1958.

At the Dept Plant Path., Univ. Illinois, Urbana, a tobacco-mosaic type virus from tomato [**37**, 599], itself non-infectious to Pinto beans (*Phaseolus vulgaris*), reduced the number of local lesions produced on beans by tobacco mosaic virus [cf. **37**, 618], the reduction being related to the proportion of the tomato virus extract in the mixed inoculum and the conc. of tomato virus protein. As the purified tomato-virus extract was less inhibitory than the crude one, it is suggested that enzymatic proteins present in crude extract may be responsible. Possible mechanisms of inhibition are discussed.

Polania Sanchez (R.). **Enfermedades del Cacao (Theobroma cacao L.) en Colombia.** [Diseases of Cacao in Colombia.]—*Acta agron. Palmira*, **7**, 1, pp. 1–70, 15 fig., 1957. [Engl. summ. 92 ref.]

The diseases are described [cf. **37**, 221] under the headings of the different parts of the plant. In addition to those previously described [loc. cit.] are: collar crack (*Armillaria mellea*), black root disease (*Rosellinia* spp.), pink disease (*Corticium salmonicolor*), cushion gall [cf. **35**, 663] (which is stated to be of recent occurrence in the country and of uncertain origin, hybrids descended from the sub-types Pajarito and Hartón being particularly susceptible), cherelle wilt, and die-back from various causes.

Arbelaez Giraldo (E.). **La llaga macana del tronco del Cacao.** [Macana disease of the trunk of Cacao.]—*Acta agron. Palmira*, **7**, 1, pp. 71–103, 16 fig., 1957. [21 ref.]

This paper contains a detailed account of *Ophiostoma* [*Ceratocystis*] *fimbriata* as the causal agent of macana rot in Colombia [**38**, 587], also known locally as trunk disease and blue rot [**37**, 222]. Bark beetles (*Xyleborus* [loc. cit.] and *Platypus* spp.) are suspected as vectors. The fungus is stated to enter wounds, causing systemic infection in cacao, and superficial localized infection in coffee and sweet potato. Following inoculation, characteristic symptoms appeared after 7 days in cacao, and 21 days in the other hosts.

Lockard (R. G.), Vamathevan (P.), & Thamboo (S.). **Swellings on the shoots of Cacao plants deficient in copper.** *Nature, Lond.*, **184**, 4679, pp. 75–76, 1 fig., 1959.

At the Dept Agric., Kuala Lumpur, Malaya, cacao seedlings grown in sand culture and deprived of Cu developed severe Cu deficiency symptoms after 273 days. In addition to leaf abscission, shortening of internodes in the abscission area, and loss of dominance by the shoot tip, swellings were noticed on the main shoots. A possible relationship between cacao swollen shoot disease symptoms in W. Africa and Cu deficiency is indicated.

Polyakov (I. M.) (Editor). Ржавчина Пшеницы. [Wheat rusts.]—*Trud. Vsesoyuz. Nauch.-issled. Inst. Zashch. Rast., 1958*, 13, 218 pp., 44 fig., 14 graphs, 1958. [115 ref. Received Oct. 1959.]

This collection of 23 original papers was compiled by the All-Union sci. Res. Inst. for Plant Protection, Leningrad, U.S.S.R. A. E. Chumakov (pp. 7–10) reports on losses caused by wheat rusts and the effectiveness of control measures, and gives

the geographical distribution of black rust [*Puccinia graminis*: **36**, 91], yellow rust [*P. striiformis*: **36**, 592], and brown rust [*P. recondita*: **38**, 252]. In the Far Eastern U.S.S.R. black rust causes 10–20% reduction of yield in average years, but under epiphytotic conditions there may be total loss. By agrotechnical measures, sowing during the most favourable period and applications of P and K at 2 and 1 centner/ha. and of 10% colloidal S at 100 l./ha., production could be increased by 20,300,000 centner/yr. Mme T. I. Fedotova (pp. 11–21) comments on the increasing susceptibility of wheat to *P. recondita* during ear formation, describing experiments with 4 local winter vars. During this period the K content of the leaves fell more sharply in the susceptible than in the resistant vars. (in Odeskaya 3 by 56%, Skorospelka L-1 20%). In the Krasnodar region aerial spraying of Novoukrainka 83 wheat at ear formation with 8% KCl reduced incidence from 39 to 17% and increased yield. The N content is increased considerably at this stage, markedly so in susceptible vars. Mme G. A. Kozyreva (pp. 22–27) showed that infection occurs mainly on older drying leaves of winter wheat and on plants with retarded or poor growth.

A. E. Chumakov (pp. 28–40) deals with the role of local foci of brown rust infection in the recurrence of disease in winter wheat. V. A. Topolovskiĭ (pp. 41–49) reports that with an increase of soil moisture incidence of *P. recondita* and susceptibility of the plants increase also. A. E. Chumakov & Mme M. A. Bystrova (pp. 50–56) deal with the effect of mineral fertilizers; in the Krasnodar region in 1952–54 powdered superphosphate+KCl at 2+1 centner ha. in the autumn and P+K (0·5+2%) during the growing period was the most effective treatment against brown rust, increasing yield by 38% and limiting incidence to 15–20% (untreated 82·4%).

Mme G. N. Egorova (pp. 57–61) discusses the role of winter wheat nutrition in the development of brown rust. Mme E. F. Karaseva (pp. 62–63) reports that K fertilizers increased resistance by an av. of 13% and decreased the viability of the uredospores. Mme O. N. Voĭtchishina (pp. 64–67) states that wheat hybrids sprayed once with 2% NaCl showed a marked increase in resistance to brown rust. Similar results were obtained with yellow rust. Mme M. A. Bystrova (pp. 68–70) deals with the effect of phosphorobacterin [**38**, 253] in reducing brown rust and increasing yield of winter wheat. It can be used effectively only in higher fields with low humidity. Mme T. I. Fedotova (pp. 71–84) gives a detailed account of measures for increasing wheat resistance to different rusts. K. M. Stepanov (pp. 85–96) deals with forecasting brown rust in winter wheat; the method is still being developed.

A. E. Chumakov (pp. 97–104) reports on preliminary studies of some features of black rust in the Far East of the U.S.S.R. K. M. Stepanov (pp. 105–116) deals with the effect of var. and weather on the development of brown rust in spring wheat, and Mme V. F. Rashevskaya & Mme V. P. Nilova (pp. 117–132) discuss the effect of different growing conditions on susceptibility of subsequent generations. Mme N. A. Naumova (pp. 134–154) describes the development of *P. striiformis* in wheat seeds and (pp. 155–169) its spread in the ear. Mme M. Y. Stepanova (pp. 170–176) deals with the development of *P. striiformis* in wheat leaves during the incubation period; infection can occur only through the stomata.

I. A. Shifman & Mme M. Y. Stepanova (pp. 177–184) report on the peculiarities of the spread of brown rust [**38**, 198] through the plant; with the E. Siberian form of the disease infection is diffuse, whereas the Leningrad strain does not form teleutospores and infection is soon localized. Mme V. P. Nilova & Mme N. G. Stepanova (pp. 185–192), dealing with the effect of *P. recondita* on metabolism in wheat, report that during the development of the fungus protein N and the carotinoids increase, while the other N substances decrease. These changes are observed also in young leaves without fungus pustules. According to Mme G. N. Egorova

(pp. 193–195) ascorbinase activity in infected wheat leaves is directly correlated with disease incidence. I. M. Polyakov (pp. 196–211) reports on the chemical immunization of wheat for the control of rusts and (pp. 212–215) on tests of new fungicides against cereal rusts, among which compound 158, a sulphamic acid derivative, proved very effective as a seed treatment when followed by spraying with the same compound or zineb.

You'll grow better Wheat following Lucerne.—*Qd agric. J.*, **85**, 7, pp. 417–421, 4 fig., 1959.

It is stated in this compilation from the judges' report on the Royal agric. Soc. 1958 Field Wheat Competition that the champion entries for the last 3 yr. have come from crops that followed lucerne in rotation. Stem rust [*Puccinia graminis*: **35**, 362] was a serious problem; it reduced the yield and caused the withdrawal of 58 (16%) of the entries. Vars. Gabo, Charter, Puora, Seafoam, and Koda were the most seriously affected; Spica, Festival, and Lawrence are the only vars. still resistant to stem rust that can be recommended by the State Dept.

Bridgmon (G. H.) & Wilcoxson (R. D.). **New races from mixtures of urediospores of varieties of Puccinia graminis.**—*Phytopathology*, **49**, 7, pp. 428–429, 1959.

At the Inst. Agric., Univ. Minn., St. Paul, the first reported genetic recombination between vars. of *P. graminis* [**37**, 767; **38**, 317, 685] in the uredial state were obtained when orange uredospores of *P.g.* var. *tritici* were mixed with red uredospores of var. *secalis* in the boots of barley plants. Isolations from Little Club wheat inoculated with uredospores from the barley 20 days after mixing gave 3 new races, which had red uredospores and attacked fewer of the standard differential wheat vars. than did the *tritici* parent but more than var. *secalis*.

Milholland (R. D.) & Young (H. C.). **Single-spore inoculation and increase applicable to the rust fungi.**—*Phytopathology*, **49**, 7, p. 455, 1 fig., 1959.

At Okla State Univ., Stillwater, spores of *Puccinia recondita* from a single pustule [on wheat] were placed in a drop of water on a slide, which was allowed to dry. A single spore was then transferred to a minute drop of water on an excised leaf from a susceptible wheat var. which had been rubbed between moist fingers (to reduce surface tension) and sprayed with distilled water before excision, and then placed in a divided Petri dish (to prevent submersion) containing a 40 p.p.m. solution of benzimidazole [**38**, 194]. After incubation for 12 days at 18–20° C. under 12 hr. light daily of 1500 ft.-c. a pustule was produced which formed a source of further inoculum.

Gorya (V. S.). Устойчивость к бурой ржавчине образцов мягкой Пшеницы в зависимости от фазы развития хозяина. [Resistance to brown rust in soft Wheat samples in relationship to the developmental phase of the host.]—*Proc. Lenin Acad. agric. Sci.*, **42**, 5, pp. 34–37, 1959.

At the Kuban Sci. Res. Inst. for Plant Breeding, U.S.S.R., 23 spring and 17 winter wheats from the VIR collection were assessed for resistance to *Puccinia triticina* [*P. recondita*: **38**, 198] at different stages of development. Among the vars. were the resistant Osetinskaya 3 and the susceptible Novoukrainka 84. Seeds were sown in autumn, spring, and summer. All vars. were most resistant at the sheathing and ear-forming stages and most susceptible in the 1st and last stages. Many severely infected in the 1st stage recovered and were highly resistant later. Magnif M.G. and Argentine were highly resistant at all stages, also Magnif M.G. × Novoukrainka 84 and the reciprocal cross. The hybrids were morphologically similar to the 1st parent.

Noulard (L.). **Recherches sur la carie du Froment, Tilletia tritici Berk. Troisième note.** [Researches on Wheat bunt, *T. caries*. 3rd note.] —*Parasitica*, **15**, 2, pp. 82–88, 1959.

Further results are presented of studies (in 1954–6) at the Sta. de Recherches de l'État pour l'Amélioration des Plantes de Grande Culture, Gembloux, on the inoculation of wheat with *T. caries* [**34**, 443]. Among spring wheats the following were totally resistant for 2 yr. or more: *Triticum monococcum* 1519 and 1541, *T. turgidum* 1573, *T. timopheevi*, *T. timococcum*, *Aegilops* × *T. durum* no. 227, White Federation 38 (CI. 11.906), Szekacs, Orfed, H. 417 Gx. 019, Selecty Cervena Presivka, Dobrowicka Presivka, and Novodvorska Niva. In addition, some vars. had only 0·1–10% infected plants, 28 of them for 2–4 yr.

Kendrick (E. L.) & Purdy (L. H.). **Influence of environmental factors on the development of Wheat bunt in the Pacific Northwest. II. Effect of soil temperature and soil moisture on infection by seed-borne spores.**—*Phytopathology*, **49**, 7, pp. 433–434, 1 graph, 1959.

In further studies at Wash. agric. Exp. Sta., Pullman [cf. **37**, 153], seed of Red Bobs wheat inoculated with *Tilletia caries* was incubated in a Palouse silt loam at 5 temps. (5–25° C.) and 6 moisture levels (9–24%). On emerging, seedlings were washed free from soil, dipped in 1:1,000 panogen 15 for 2 min. to prevent further infection from still adherent spores, and planted in the greenhouse, bunt percentages being recorded at maturity. A combination of 10° and 13% moisture was the most favourable for bunt development, which was relatively high at 11, 18, and 24% moisture, fell rapidly (to around 30% at 10°) at 10%, and was absent at 9%. At all moisture levels infection was max. at 10° and next greatest at 15° and 5°; less than 5% occurred at 20° and none at 25°.

Kendrick (E. L.). **The mineral oil seal method for maintaining cultures of Tilletia caries for long periods.** —*Phytopathology*, **49**, 7, p. 454, 1959.

At the U.S. Dept Agric., Pullman, Wash., monosporidial lines of *T. caries* were successfully maintained under mineral oil seal [**27**, 329] for 3½ yr. As there is a tendency to change from sporidial to mycelial growth several replications should be kept under oil and transfers made at least once every 2 yr. if sporidial cultures are to be maintained.

Borisenko (S. I.). Прием, повышающий устойчивость Пшеницы к поражению головней. [A method for increasing Wheat resistance to smut.]—Селек. Семеновод. [*Selek. Semenovod.*], **24**, 2, pp. 40–41, 1959.

At the Ukrainian Res. Inst. for Plant-growing, Genetics, and Selection, seed of the spring wheat vars. Narodnaya and Gordeiforme 48-2, susceptible to loose smut [*Ustilago nuda*: **38**, 253] under local conditions, and Gordeiforme 46 and Otechestvennaya, susceptible to bunt [*Tilletia* sp.], was subjected to hot air treatment (30 days at 25°, 4 hr. at 45°, and 40 min. at 80° C.). The best results were given by 4 hr. at 45°. Loose smut was reduced from 40 to 8·6% in Narodnaya and from 18·9 to 6·4 in Gordeiforme 48–2, the figures for bunt being from 57·7 to 24·4% in Gordeiforme 46 and from 19·1 to 1–1·5 in Otechestvennaya. Hot air treated seeds gave a somewhat higher yield.

Powers (H. R.), Schafer (J. F.), & Caldwell (R. M.). **A pathogenic strain of Erysiphe graminis f. sp. tritici attacking Asosan Wheat.**—*Plant Dis. Reptr*, **43**, 7, pp. 762–763, 1959.

This strain, obtained in Indiana in 1958, is tentatively designated race 2A. Other vars. used for resistance tests, including Hope, Michigan Amber Selection, and Suwon 92, were also attacked [cf. **37**, 228]. On the basis of reaction of host vars.

with known genotypes the genotype for race 2A can be designated as $V_a A_c A_t A_u$ where A and V denote avirulence and virulence and the subscripts complimentary host genes.

GLYNNE (MARY D.) & SLOPE (D. B.). **Effect of previous Wheat crops, seed-rate and nitrogen on eyespot, take-all, weeds and yields of two varieties of winter Wheat : field experiment 1954–56.**—*Ann. appl. Biol.*, **47**, 2, pp. 187–199, 1959.

The experiment described was carried out at Rothamsted exp. Sta. to measure the effects of previous crops susceptible to eyespot (*Cercosporella herpotrichoides*) and take-all (*Ophiobolus graminis*) [cf. **38**, 652] upon these diseases on winter wheat in comparison with those of other treatments upon yields, disease incidence, and the prevalence of weeds in different years. The land used had not carried wheat or barley for 2 yr. Wheat, field beans, and potatoes were grown on different blocks in the 1st 2 yr. and were followed by wheat. Measurements were made of the effects on the high-yielding var. Cappelle and on Holdfast, which gives lower yields of smaller, high-quality grain, of 1 and 2 preceding wheat crops, of seed-rate, and N, and, in the last year, of spraying in early spring with sulphuric acid.

In 1954 the mean wheat yields from plots that had carried oats, beans, or potatoes during the 2 preceding yr. were 39·2 cwt. acre for Holdfast and 42·6 for Cappelle: in 1955 they were 42·8 and 55·8, and in 1956 34·9 and 49·6. Previous wheat crops had more effect than any other treatment in increasing the incidence of eyespot, take-all, and weeds, and in decreasing the number of ears/unit area and the yield of grain. In 1956, on plots bearing the 1st, 2nd, and 3rd successive wheat crop, the percentages of straws with eyespot were, respectively, 12, 54, and 42, and with take-all 0·1, 1, and 16. Cappelle was less severely infected by eyespot than Holdfast. The 2nd and 3rd successive wheat crops averaged 23·3 cwt./acre yield less than the 1st. Cappelle consistently yielded more than Holdfast, the mean difference being 13·8 cwt. acre after potatoes but only 3·8 cwt./acre after 2 wheat crops.

The higher seed rate (Holdfast 3 bush. acre each yr., Cappelle 3 in 1954, 4 in 1955 and 1956) gave an av. increase in grain yield of 3·3 cwt./acre over the lower (Holdfast 1½ and Cappelle 1½ and 2, respectively), but where both diseases were severe the lower rate yielded as much total and more dressed grain than the higher.

It is concluded that the 2 diseases and weeds were evidently the main factors depressing yield, sharp eyespot (*Corticium solani*) and brown foot rot (*Fusarium* spp.) having but little effect; all 3 factors tended to be increased by the same rotations.

SALT (G. A.). **Effect of nitrogenous fertilizer applied at different dates on take-all, eyespot and yield of winter Wheat grown on light sandy loam.** *Ann. appl. Biol.*, **47**, 2, pp. 200–210, 1 graph, 1959.

In an experiment at Woburn, Beds., in 1954–56, the winter wheat vars. Cappelle and Holdfast were grown after potatoes with dung, and N was applied at 0, 3, and 6 cwt./acre of nitro-chalk either in Oct. and Mar. or May, or in March, or Apr., or May in the various treatments. Some eyespot (*Cercosporella herpotrichoides*) [cf. **35**, 152 and above] developed each year, but much less than at Rothamsted; Holdfast had more infections than Cappelle, the difference being increased by nitro-chalk, probably because Holdfast tillers more than Cappelle, increasing humidity. The fertilizer increased the disease most when applied in Mar., least in May. The percentage infection remained small throughout in the unfertilized plots, in which growth was poor. Doubling the seed-rate slightly increased eyespot at the higher level of N, but had no effect without N.

The amount of take-all (*Ophiobolus graminis*) [loc. cit.] present at harvest

increased in each wheat crop (9, 15, and 26% for the 3 yr., respectively) and was slightly greater than in similar plots at Rothamsted. Cappelle consistently had a higher (but not significantly higher) percentage infection than Holdfast. Nitrochalk reduced the amount of take-all at harvest more when applied in Apr. than in Mar.; applied in May, it had small effect, except an increase in 1956. Decreasing the seed-rate decreased take-all only in the unfertilized plots. Take-all did not develop in patches, but appeared as whiteheads scattered throughout the crop.

Fusarium spp. caused browning on under 1% of the straws. Sharp eyespot (*Corticium solani*) occurred each year, but the lesions seldom caused damage; the percentages of infected straws for the 3 yr., respectively, were 1·6, 1·2, and 6·8 in the unfertilized plots, and 4·8, 6, and 8·4 in those fertilized at the max. rate. Both vars. were similarly affected.

Wallace (H. A. H.). **A rare seed-borne disease of Wheat caused by Podosporiella verticillata.**—*Canad. J. Bot.*, **37**, 4, pp. 509–515, 1 pl., 1959.

An account is given of morphological studies at the Canada Dept Agric., Winnipeg, of *P. verticillata* (*Phytopathology*, **5**, pp. 323–325, 1915), with a note on its taxonomy. The fungus was occasionally isolated from samples of common and durum wheat grown in 1946–49 [**30**, 307]. It is synonymous with Drechsler's *Helminthosporium cyclops* [cf. **3**, 65]. Naturally infected seed did not germinate. Inoculation of mature seed of cereals did not impair germination or plant growth but when wheat and oat inflorescences were sprayed with a spore suspension the seed developing later, though outwardly healthy, did not germinate or else gave rise to stunted seedlings, apparently owing to a toxin formed by the fungus. The disease is unlikely to prove of economic importance.

Glass (R. J.), Ponte (J. G.), Christensen (C. M.), & Geddes (W. M.). **Grain storage studies. XXVIII. The influence of temperature and moisture level on the behaviour of Wheat stored in air or nitrogen.**—*Cereal Chem.*, **36**, 4, pp. 341–356, 6 graphs, 1959. [14 ref.]

In further studies at Minn. agric. Exp. Sta., St. Paul [**38**, 510 and below], samples of sound wheat were stored in air or N (containing 0·04% O) at 20° and 30° C. and moisture contents of 13–18% and examined at 2–4-weekly intervals for mould incidence and other detrimental changes. At 20° deterioration and germ damage progressed much more slowly in N than in air, while viability in N also remained fairly high for 16–24 weeks, even at a moisture content of 18%. At 16% moisture a No. 2 composite dark northern spring wheat and high-grade Marquis stored in N were free from germ damage after 40 and 48 weeks, respectively, whereas 100 and 95%, respectively, of the same samples maintained in air were 'sick'.

Storage in N prevented mould (chiefly *Aspergillus* and *Penicillium* spp.) at all moisture levels but not decreases in non-reducing sugars, increases in fat acidity, or death and discoloration of the embryos, especially at 30°. It is concluded that at 30° hermetic (inert) storage is impracticable for damp wheat owing to the very active metabolism of the seed. At 20°, however, a combination of reduced enzymatic activity and exclusion of moulds by N might contribute to the prolongation of storage life.

Griffiths (D. A.), Hodson (A. C.), & Christensen (C. M.). **Grain storage fungi associated with mites.**—*J. econ. Ent.*, **52**, 3, pp. 514–518, 2 fig., 1959.

At Minn. agric. Exp. Sta., St. Paul, *Acarus siro* and *Tyrophagus castellanii* were found in some abundance in commercially stored wheat samples with a moisture content of 13·5–15%, i.e. the range at which moulds of the *Aspergillus glaucus* group, e.g. *A. amstelodami*, *A. ruber*, and *A. repens*, tend to predominate [**34**, 587; cf. above, *et passim*]. Developing in mouldy grain, the mites picked up the fungal

spores, which they carried on their bodies and in their digestive tract and faeces. They thus inoculated the clean grain as they entered it and subsequently fed to a considerable extent on the developing moulds.

KASSANIS (B.) & SLYKHUIS (J. T.). **Some properties of Barley stripe mosaic virus.** —*Ann. appl. Biol.*, **47**, 2, pp. 254–263, 1 pl., 1 graph, 1959.

This paper from Rothamsted exp. Sta. on barley stripe mosaic virus supplements data already noticed [**38**, 736].

Infectivity and serological activity were destroyed at 65° C. for 10 min. Sap remained infective after 32 days at 20°, but lost infectivity and half its serological activity in 3 days at −20°: sugar added to sap prevented inactivation by freezing. The virus content of inoculated barley leaves increased most rapidly in plants kept at 24–28°. At 24° increase was most rapid during the 1st 5 days; max. virus conc. was attained about 10 days after inoculation. The highest infection end-point of sap was 1 2,048, when the precipitation end-point with virus antisera was 1/256, and sap contained 10^{13} virus particles ml.: the ratio of infectivity to serological activity and to number of virus particles is much smaller than with tobacco mosaic virus.

The rod-shaped particles are about 20 mμ wide and mostly (in fresh sap) between 135 and 175 mμ long. Heating to 50° causes the particles to aggregate linearly. Preparations partially purified by alternate cycles of low- and high-speed centrifugation and by precipitation with ammonium sulphate contain 0·35–0·53% P, 12·3–13·2% N, and 6·2–10·2% carbohydrate. Such preparations are insoluble in water, but dissolve in borate buffer at pH 7·5 and become inactive at pH values below 4·5.

MARSHALL (GILLIAN M.). **The incidence of certain seed-borne diseases in commercial seed samples. I. Loose smut of Barley, Ustilago nuda (Jens.) Rostr.** *Ann. appl. Biol.*, **47**, 2, pp. 232–239, 1959.

A survey of the incidence of *U. nuda* in barley seed samples submitted to the Official Seed Testing Sta., Cambridge, was made by means of a simple, whole-embryo test based on a modification of existing methods [cf. **38**, 507]. Embryos from 1,000 grains can be reported on within 24 hr., the actual working time, 1,000 grain sample being a little over 1 hr.

A random sub-sample (1,000 grains) is shaken up in 10% NaOH and left overnight at 22° C. Hot water is then added and a thorough shaking and washing under warm, running water on to 3 sieves with hole-sizes of 3·5, 2, and 1·5 mm. releases the embryos. The 2 lowest (the lowest has most of the embryos) are placed in a flat dish containing water and the floating embryos are transferred by pipette to a beaker, also any left on the top sieve. Excess water is drawn off and lactophenol added when the embryos can then be stored for several weeks. The beakers containing the embryos are gently heated before examination and when cleared the embryos are arranged in rows on grooved perspex trays. The results of examination for *U. nuda*, the hyphae of which show clearly in the cleared tissue, showed a high positive correlation with incidence in the field (r = 0·83).

Examination of commercial samples of seed barley during 1954–57 enabled the vars. to be clearly divided into 2 groups: the Scandinavian-bred (e.g. Carlsberg, Herta), with 84% of the samples infected and a level of infection of up to 19%; and the English-bred (e.g. Proctor, Plumage-Archer), with only 9·5% of the samples infected and a level of infection seldom over 0·5%. Seasonal variations were not observed.

TIKHONOVA (Mme N. A.) & GORLENKO (M. V.). Использование солнечной энергии в борьбе с пыльной головни озимого Ячменя в Крымской области. [The use

of solar energy for the control of smut in winter Barley in the Crimea region.] —*Proc. Lenin Acad. agric. Sci.*, **24**, 5, pp. 38–40, 1959.

After the seed of 2 winter barley vars. had been soaked in water for 6 hr. on the soil surface at 40–46° C., and then exposed to the sun (54·5–56°) for 4½ hr. the incidence of smut [*Ustilago nuda*: **36**, 19] in 50 sq. m. plots was 2 infected plants in Krasnodarskii 2929 and none in N-8606, while in the plots from untreated seed there were 20·5 and 12·5, respectively. Humidity at the initial stage of heating was 9·9%, dropping to 7·6% after 6 hr. solar heating. Germination was not decreased. If the wetting and heating were repeated twice, plants at the ear-forming stage were completely free from infection. The incidence of covered smut [*U. hordei*: **34**, 145] was also considerably reduced.

Protsenko (A. E.). Электроноскопия фитопатогенных вирусов. III. Вирус закукливания Овса — **Graminevirus avenae Rÿzhkov.** [Electron micrography of phytopathogenic viruses. III. Virus causing 'zakuklivanie' of Oats—*G. avenae*.]—Воп. Вирусол. [*Vop. Virusol.*], **4**, 4, pp. 481–483, 2 fig., 1 graph, 1959. [Engl. summ.].

The particles of oat pseudo-rosette virus from naturally infected oat leaves studied at the microbiol. Inst. Soviet Acad. Sci. [cf. **38**, 72, 192] proved to be comparatively short rods, 150 × 20 mμ. This virus is from the group of yellows viruses transmitted only by cicadae, and there is an incubation period in the vector's body.

Garay (A. S.). **Der Zusammenhang zwischen Fruchtkörperbildung und Atmung im Falle des Mutterkorns unter besonderer Berücksichtigung der Bedeutung der Fumarsäure.** [The correlation between fruit body formation and respiration in the case of ergot, with particular reference to the significance of fumaric acid.]—*Physiol. Plant.*, **11**, 1, pp. 48–55, 1958.

Experiments at the Institut für Pflanzenzüchtung und Pflanzenbau, Fertöd, Hungary, revealed that during the formation of stromata from sclerotia of strain Magyar 12 of ergot [*Claviceps purpurea*: cf. **36**, 465; **38**, 404] from rye respiration increased 2–3 fold. The RQ of fruit bodies is 0·94, that of the sclerotia 0·7. Malonic acid and particularly fumaric acid inhibited O consumption of stromata but had no marked influence on the sclerotia. It is possible by means of malonic and fumaric acid to inhibit the formation of stromata, but this effect can be counteracted by succinic acid. Citric and malic acids do not influence respiration but exercise a slight inhibitory effect on stromatal formation.

Campbell (W. P.). **Inhibition of starch formation by Claviceps purpurea.**—*Phytopathology*, **49**, 7, pp. 451–452, 1959.

At the Sci. Service Plant Path. Lab., Edmonton, Alta, when starch free potato extract was added to a solution of the K salt of glucose-1-phosphate the presence of starch was demonstrable after 10 min. at room temp. If a little filtered honeydew or aqueous extract of powdered ergot was added with the potato extract, no starch was detected, though its formation was not inhibited if the ergot extract or honeydew was boiled before introduction. This indicates that *C. purpurea* [cf. **36**, 465; **38**, 687] possesses a starch phosphorylase inhibitor preventing conversion of sugars to starch and preserving the sugars of the host in forms available to the fungus.

Ruokola (Anna-Liisa). **Torajiväsienen, Claviceps purpurea (Fr.) Tul. in sklerotioiden itämisestä.** [Sclerotial germination in the ergot fungus, *C. purpurea*.]—*Maataloust. Aikakausk.*, **29**, pp. 218–228, 2 fig., 1957. [Germ. summ. Received July, 1959.]

At the phytopath. Inst., Univ. Helsinki, Finland, germination occurred only at

low temp. [cf. **21**, 70], up to 87% being reached by a German strain D1 held continuously at 1° C. or alternate weeks at 1° and 18·6° for a month. A 34-day cold treatment enhanced germination more in this strain than in a Finnish one. In general, sclerotia kept in the laboratory for 1 yr. failed to germinate. Treatment of the sclerotia with rye pollen increased germinability by a max. of 32–52%.

In field experiments the sclerotia germinated up to 24 days before the onset of flowering in adjoining rye. The stromata formed by sclerotia lying in the soil at a depth of 1 cm. contained normal asci and ascospores, but at 20 and 50 cm. development was abortive. The germination of the alkaloidless Finnish strain was somewhat higher than that of the German, rich in alkaloids.

In the field the sclerotia were not extensively colonized by other fungi, but in the laboratory there was an abundance of moulds, including *Trichothecium roseum*, which ultimately destroyed them.

Zhukova (Mme K. P.). Болезни всходов Кукурузы в условиях нечерноземной полосы и меры борьбы с ними. [Diseases of Maize shoots in the non-black soil zone and measures for their control.]—*Proc. Timiryazev agric. Acad.*, *1959*, 41, pp. 121–125, 1959.

Tests in Dmitrovski district, Moscow region, U.S.S.R., on factors affecting disease incidence in maize, especially of *Fusarium solani* and *F. moniliforme* [*Gibberella fujikuroi*], were made on an experimentally inoculated medium-argillaceous soil, temp. 12–26° C. and humidity 60–65%. When seed was sown 2 cm. deep only 3·4% severe infection developed, compared with 10·7 at 6 and 17·8% at 8 cm. Fertilizers with a P or P–K basis [**38**, 365] were best. In tests in the Krasnodar district seed treatment of Krasnodarskaya 1 49 maize with thiram+heptochlorom (1·5 kg. ton) gave 81·7% germination, 0·5% severe infection, and 371 kg. green wt. 100 sq. m. compared with 48·3%, 13·5%, and 200 kg. for the untreated. Thiram alone was less effective.

Yakimovich (E. D.) & Tymchenko (L. F.). Оценка протравителей семян Кукурузы. [Assessment of Maize seed treatment.]—*Proc. Timiryazev agric. Acad.*, *1959*, 41, pp. 127–132, 1959.

Of 7 seed treatments applied immediately before sowing by the sci. Res. Inst. Agric. in the central districts of non-black soil, U.S.S.R., against moulds on Partizanka and Krasnodarskaya hybrid 1 49 maize, 2% mercuran at 200 g./centner and granosan at 150 g. were the best, with 18·7–23·1% and 15·5–18·1% increase in green matter over the untreated. For treatment 1–5 months before sowing granosan at 100 g. proved the best, giving a 25·7% higher yield.

Yakovleva (Mme N. P.). О некоторых особенностях пузырчатой головни Кукурузы. [On some characteristics of blister smut in Maize.]—*Proc. Timiryazev agric. Acad.*, *1959*, 41, pp. 133–135, 1959.

In the Moscow region, U.S.S.R., 3 types of infection by *Ustilago zeae* [*U. maydis*: **38**, 513] were recognized: infection at the 3-leaf stage, which spreads to cause death of the young plants; neck infection which spreads only 15–20 cm. from the point of attack; and infection at the 6–8-leaf stage, which also kills the plant. Most resistant was the late var. Partizanka, with only 1·4% infection compared with 8·6 in Voronezhskaya 76 and 8·4% Zhemchyshina Chakinskaya, both early vars.

Koehler (B.). **Corn ear rots in Illinois.**—*Bull. Ill. agric. Exp. Sta.* 693, 87 pp., 26 fig., 5 graphs, 1959. [67 ref.]

Ear rot diseases of maize in the field and in storage are described, with records of prevalence and estimates of financial loss, followed by a discussion of experiments on various factors influencing prevalence and on methods for inducing epidemics as an aid to selection for resistance [cf. **33**, 78].

Padmanabhan (S. Y.), Ganguly (D.), & Jha (M. P.). **A method of estimating the loss caused by blast disease of Rice.**—*Indian J. agric. Sci.*, **28**, 1, pp. 87–96, 1958.

At the Central Rice Res. Inst., Cuttack, 3 fields planted with the highly susceptible short duration rice Co. 13 and 1 with the moderately susceptible T. 1145, all 4 naturally infected by *Piricularia oryzae* [**38**, 593], were variously sprayed with Cu fungicides in order to produce a range of infection (2·5 71·5%). At harvest neck infection was estimated in each plot and yields were recorded. The loss in yield due to each 1% increase in neck infection was approx. 1% under the experimental conditions.

Sato (K.), Sakamoto (M.), Kudo (S.), & Omatsuzawa (T.). **Studies on the Helminthosporium leaf blight of Rice plant. Part 2. Histological observations on the inner epidermal tissues of leaf-sheaths inoculated with the blight fungus.**—*Rep. Inst. agric. Res. Tôhoku Univ.*, **10**, 1, pp. 15–29, 2 pl. (16 fig.), 1 diag., 2 graphs, 1959. [17 ref.]

In further studies [cf. **37**, 232] blight lesions (*Cochliobolus miyabeanus*) were classified in 5 groups according to differences in hyphal development in the host tissue, the discoloration and granulation of the infected cell contents, and the size of the affected area; following the same criteria, blast lesions (*Piricularia oryzae*) formed 4 groups. The type of lesion present on the leaf sheaths depended on its age and position on the haulm. The resistant, very small type of blight lesion was found exclusively on the elongating, uppermost (youngest) leaf sheath, but lower on the plant it was gradually replaced in order by the other types of lesion. On the other hand, the susceptible type of blast lesion was more frequent on the upper than the lower leaf sheath, suggesting greater resistance of younger tissues to blight, but greater susceptibility to blast. Intensified fungal invasion was noted in plants given additional N, but having regard to the leaf positions on the same plant the above differences were maintained. Sheath inoculation showed that blast-resistant rice vars. were not necessarily resistant to blight.

Norman (P. A.) & Grant (T. J.). **Transmission of T_3 severe strain of tristeza virus of Citrus by Melon aphid.**—*J. econ. Ent.*, **52**, 4, pp. 632–634, 1 fig., 1959.

An expanded version of a report already noticed [**37**, 535].

Klotz (L. J.), Wong (P.-P.), & DeWolfe (T. A.). **Survey of irrigation water for the presence of Phytophthora spp. pathogenic to Citrus.** *Plant Dis. Reptr.*, **43**, 7, pp. 830–832, 1959.

In studies by the Univ. Calif. Citrus Exp. Sta., Riverside, in which *P.* spp. were trapped on 'silver stage' lemons [**37**, 660] hung 5–20 in a perforated plastic bag for 2 weeks in reservoirs and canals supplying citrus groves, *P. citrophthora* was found throughout the year 1957–8 (water temp. range 6–31° C.), *P. syringae* was found in spring and winter (6–17°), and *P. parasitica* in summer and early autumn (17–31°). *P. hibernalis* and *P. megasperma* were not detected. An unidentified *P.* sp. which could withstand 45° C. and could produce gumming bark and cambial lesions on citrus yearlings was detected in one canal. [This information also appears in *Calif. Agric.*, **13**, 11, pp. 3, 16, 1959.]

Garber (R. H.) & Houston (B. R.). **An inhibitor of Verticillium albo-atrum in Cotton seed.**—*Phytopathology*, **49**, 7, pp. 449–450, 1 fig., 1959.

At the Univ. Calif., Davis, it was found that the testas of cotton seed of the vars. Delta-pine 15 (susceptible) and Acala 4–42 (resistant to *V. alboatrum* wilt) [**38**, 5] contained a substance that was fungistatic (but not fungicidal) to this pathogen. Growth was inhibited round seed or separated seed coats in agar sown with conidia,

but on removal to fresh agar the ungerminated conidia grew normally. The inhibitor was extractable in hot water, the extract inhibiting and the extracted seed coats failing to inhibit growth. Once extracted the substance did not reaccumulate in treated seed stored for a month at room temp.

Babayan (A.). К системе агротехнических и профилактических мероприятий борьбы с вертициллиозным увяданием Хлопчатника. [On the system of agrotechnical and prophylactic measures for the control of *Verticillium* wilt of Cotton.]—Хлопководство [*Khlopkovodstvo*], **9**, 7, pp. 41–46, 1959.

In experiments by the Armenian agric. sci. Res. Inst., U.S.S.R., cotton sown in rice fields developed very little wilt (*V.* [*dahliae*: **38**, 5]). Incidence was also reduced by ploughing to a depth of at least 40 cm. before sowing, denser sowing, and sowing after the end of Apr. (5 Apr. 46·1% infected plants, 5 May 21·3%). N fertilizers increased yield from both healthy and infected plants and in districts with high incidence an application is recommended during the second half of Aug. Irrigation should be carried out according to soil conditions and the leaf sap before watering should not be higher than 12%, measured by the field refractometer. In all districts with high incidence the plants should be uprooted and destroyed.

Solov'eva (Mme A.) & Urmanova (Mme K.). Некоторые данные о химическом способе борьбы с фузариозным увяданием Хлопчатника. [Some data on the chemical method for control of *Fusarium* wilt of Cotton.]—Хлопководство [*Khlopkovodstvo*], **9**, 7, pp. 46–48, 1959.

In greenhouse experiments at the Uzbek agric. Acad., U.S.S.R., the highly susceptible cotton var. 5476 was grown in soil artificially infested with *F.* [*oxysporum* f.] *vasinfectum* [**38**, 407] at R.H. 60–65%. Ethylenedibromide introduced at 2–4 ml./pot at a depth of 10–20 cm. completely disinfected the soil. In the field an interval of at least 16 days was found necessary between application (20 cm. depth) and sowing: infection was completely eliminated though it was 84·6% in untreated soil. In a large scale trial 360 l./ha. gave complete control. The compound should never be used during the growing period.

Shver (E. V.). Обработка семян сухими препаратами. [Treatment of seeds with dry preparations.]. *Ex* Хлопководство в СССР. [Cotton growing in the U.S.S.R.], pp. 476–483. Moscow, Agricultural State Publishers, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 14, p. 210, 1959.]

At the Sverdlov State Farm, Tashkent, treatment of cotton seed with granosan over a 3-yr. period gave a 0·1–4·7% reduction of gummosis [*Xanthomonas malvacearum*: **38**, 407, 599] and almost complete freedom from [unspecified] root rot. Less toxic to man and animals is 20% copper trichlorophenolate, which at 7 kg./ton was more effective than formalin, the best results being obtained with treatment 1–5 months before sowing. It increased yield by 10% and almost completely inhibited *X. malvacearum*, root rot also being reduced. Seed so treated can be further treated with BHC dust without impeding germination.

Forsberg (J. L.). **Snapdragon diseases.** *Flor. Exch.*, **132**, 6, pp. 15, 19, 1959.

Short notes on symptoms and control are given for several diseases of snapdragons in the U.S.A., including rust (*Puccinia antirrhini*) [**35**, 380], *Phyllosticta* blight (*P. antirrhini*) [**37**, 702], anthracnose (*Colletotrichum antirrhini*) [cf. **33**, 209], *Phytophthora* stem rot (*P. cactorum*) [**13**, 31], and *Myrothecium* canker (*M. roridum*) [**25**, 345].

Withner (C. L.) (Editor). **The Orchids: a scientific survey.** ix+648 pp., 61 pl., 21 fig., 8 graphs, 1 map, New York, Ronald Press Co., 1959. $14.00.

This is a well-produced and most useful book (No. 32 in the Chronica Botanica

New Series of Plant Science Books), comprising 18 contributions by various specialists, including sections by H. Burgeff (pp. 361–396) on mycorrhiza of orchids [cf. **38**, 481], P. A. Ark (pp. 419–430) on fungal and bacterial diseases, and D. D. Jensen (pp. 431–458) on virus diseases.

Michalski (A.). **Doświadczenia nad zwalczaniem szarej pleśni (Botrytis paeoniae Oudem.) Piwonii.** [Experiments in the control of grey mould (*B. paeoniae*) on Peonies.]—*Wiadom. bot.*, **2**, 3, pp. 178–180, 1958. [Abs. in *Referat. Zh. Biol., 1959*, 13, p. 197, 1959.]

In the very wet hot spring of 1957 (May) *B. paeoniae* developed intensively on peonies [cf. **33**, 676; **36**, 197]. To prevent the loss of the peony collection at the IHAR bot. Gardens, Bydgoszcz, Poland, the infected parts were removed and the plants sprayed with Bordeaux mixture. Following the repeated removal of infected parts, the beds were dug over, the soil around the infected peonies removed to a depth of 20 cm., and the side walls of the pits sprinkled with a layer of fine gravel. When the infection was overcome, the holes were filled with soil.

Griffiths (E.). **The cytology of Gloeotinia temulenta (blind seed disease of Rye-grass).**—*Trans. Brit. mycol. Soc.*, **42**, 2, pp. 132–148, 2 pl. (30 fig.), 3 fig., 1959. [35 ref.]

Studies at the Dept agric. Bot. Univ. Coll. Wales, Aberystwyth, showed that mutation and sexual recombination are the only sources of genetic variation in *G. temulenta* [**38**, 262], the vegetative cells of which are uninucleate, and cannot form heterokaryons. The chromosome number (n = 15) was determined during mitosis and meiosis: a prominent 'heterochromatic association' was noted during both. The mitotic chromosomes vary from 0·25 μ to just under 1 μ; most, if not all, chromosomes are highly heterochromatic. Prominent 'prochromosomes' approximating in size and number to the mitotic chromosomes are found in resting nuclei. Nucleolar activity, positively correlated with cytoplasmic basophilia, is greatest in young vegetative hyphae and young asci, which actively synthesize cytoplasmic protein. The nucleolus is not essential for nuclear reproduction as it is absent from microconidiophores, where the nucleus divides repeatedly. The microconidia do not germinate, probably due to the very low conc. of ribose nucleic acid (RNA) in the cytoplasm resulting from an elaborate pattern of cytological and cytochemical differentiation in the microconidiophores and associated cells; their function is purely sexual. The ascogonium of *G. temulenta* consists of a coiled hypha embedded in a small stroma. In stromata fertilized by compatible microconidia young ascogenous hyphae with binucleate cells are produced and subsequently grow up the centre of the apothecium and proliferate in the subhymenium to yield asci. The behaviour of the nuclei in the ascus shows no peculiarities.

Cormack (M. W.) & Lebeau (J. B.). **Snow mold infection of Alfalfa, grasses, and winter Wheat by several fungi under artificial conditions.**—*Canad. J. Bot.*, **37**, 4, pp. 685–693, 1 pl. (7 fig.), 1959.

In further work at the Canada Agric. Res. Sta., Lethbridge, Alta, on the low temp. basidiomycete causing snow mould damage [**38**, 753], and on *Typhula* spp. (*T. idahoensis*, *T. itoana*, and *T.* ? *trifolii*), and *Sclerotinia borealis* [cf. **37**, 50, 494], plants were grown in pots placed in specially designed 'snow mould' cabinets in which temp., R.H., and light were controlled. The top cabinet in the stack received light through a glass lid; lower cabinets were unlighted. Max. infection by the basidiomycete and *T.* spp. occurred when soil inoculated plants were incubated for 2 months at 2° C. and 80–90% R.H.; saturation of the atmosphere checked mycelial growth and infection. Freezing and complete dormancy were not necessary for infection by the basidiomycete. Greenhouse plants were better able to withstand

the long incubation at low temp. after conditioning for 2 weeks at 25° and 8 hr. light daily.

The plants used (Grimm lucerne, *Festuca rubra*, *Poa pratensis*, *Agrostis alba*, *Phleum pratense*, and Kharkov winter wheat) behaved as had previously been observed in the field [cf. **32**, 258]. *T. idahoensis* caused moderate to severe and *T. itoana* slight to moderate damage to grasses and winter wheat. *T.* ? *trifolii* isolated from lucerne was highly virulent to it. Only the basidiomycete synthesized HCN in culture or in the plant tissues. *S. borealis* slightly damaged winter wheat and grasses after 3 months at 2° but the conditions used did not favour its max. development. The observations made, as a whole, emphasized the influence of environmental factors on snow mould development.

Uspenskaya (Mme G. D.). Пятнистости листьев Клевера в Московской области. [Clover leaf spots in the Moscow region.] Науч. Докл. высш. Школ. [*Nauch. Dokl. vÿssh. Shkol.*], Ser. biol. Sci., *1959*, 1, pp. 93–97, 1959.

The author lists 18 fungal and 1 bacterial disease [cf. **37**, 297] which produce spots on the vegetative organs of 6 spp. of clover, with the organs affected. Infection is considerable on 3-yr.-old clover. Spot infection decreases from the edge of the field to the centre. The diseases enumerated include *Peronospora pratensis* [*P. trifoliorum*: map 343], *Cercospora zebrina*, and *Stemphylium sarciniforme* [map 139] on *Trifolium pratense*, *P. trifolii-hybridi* [*P. trifoliorum*] on *T. hybridum*, *P. trifolii-repentis* [*P. trifoliorum*] on *T. repens* and *T. montanum*, and *P. trifoliorum* and *C. zebrina* on *T. medium*.

Rodigin (M. N.) & Zhuravleva (Mme L. G.). О конидиальной стадии **Pseudopeziza medicaginis (Lib.) Sacc.** [On the conidial state of *P. medicaginis*.]—*Bot. Mater. (Notul. syst. Sect. crypt. Inst. bot. Acad. Sci. U.S.S.R.)*, **12**, pp. 211–213, 1 fig., 1959.

In experiments in 1951–2 in the experimental field of the Bashkir agric. Inst. it was shown that *P. medicaginis* [cf. **38**, 149] has a conidial state, *Phoma medicaginis*, on lucerne, which enables it to overwinter on infected dead lucerne stalks.

Ford (R. E.). **Fusarium blight of Birdsfoot Trefoil.** *Phytopathology*, **49**, 8, pp. 481–486, 3 fig., 1959.

An expanded account, from Cornell Univ., Ithaca, N.Y., of information already noticed [**38**, 482] concerning a disease of *Lotus corniculatus* caused by *F. roseum*, observed in 1957 and unlikely to prove serious, as conditions favouring it (high temp. and free water on the leaves for at least 10 hr.) seldom occur. The foliage of Narragansett and DuPuits lucerne and Pennscott red clover also proved susceptible to inoculation, as did 6 other *L.* spp.

Hutton (K. E.). **Some recent developments in black spot control.** —*Contr. N.S.W. Dep. Agric.* 403, 5 pp., 2 fig., 1958. [Received Aug. 1959.]

A popular note on autumn eradicant spraying against *Venturia inaequalis* with phenyl mercuric chloride [**37**, 134; **38**, 120 *et passim*]. Another development in black spot control was a spray warning service in the Batlow district, in conjunction with a Hirst spore trap to obtain data on spore movement. It was established that max. infection potential exists during Oct. and Nov., the peak danger period being about the middle of Oct. [**36**, 456].

Vanin (I. I.). Новый препарат для борьбы с паршой Яблони. [A new preparation for the control of Apple scab.]—*Sad i Ogorod*, **96**, 4, p. 61, 1958.

In U.S.S.R. a new preparation (50% zineb, 10% sulphite liquor, 2% casein, 2% air-slaked lime, and 36% kaolin as a filler) was tested against apple scab [*Venturia inaequalis*: cf. **38**, 150] on 4 vars., at 0·05% in comparison with 0·75 and 1%

Bordeaux mixture. Scabbed fruit on sprayed trees varied from 0·5% on Antonovka obŷknovennaya to 8·6% on Kitaĭka zolotaya rannyaya, and scabbed leaves 0–4·6%. On unsprayed trees fruit scab was 100% on Kitaĭka zolotaya rannyaya, 40·9 on Korichnoe polosatoe, 14·6 on Antonovka obŷknovennaya, and 6·1% on Pepin Shafranne. Leaf infection was 17·1, 8·7, 15·6, and 1·2%, respectively. On trees treated with the zineb preparation infected fruits ranged from 0·1% on Kitaĭka zolotaya rannyaya to 4·4% on Korichnoe polosatoe. For Bordeaux mixture the figures were Kitaĭka zolotaya rannyaya 0·3, Pepin shafrannŷĭ 25·3, and Antonovka obŷknovennaya 38·3%.

Taranova (Mme E.). Наследование устойчивости к парше у гибридных сеянцев Яблони. [Inheritance of resistance to scab in hybrid Apple seedlings.]—*Latv. PSR Zinat. Akad. Vestis.*, *1958*, 8 (133), pp. 51–56, 1958. [Latvian summ.]

At the Exp. Sect. biol. Inst., Latvian Acad. Sci., Riga, in 1955–57, 11 apple vars. and 580 hybrids from them were tested for their resistance to scab (*Fusicladium dendriticum*) [*Venturia inaequalis*]. Scab developed from the 1st half of May to the 2nd half of Aug. and the degree of infection depended on the weather. The most resistant vars. were Seyanets Trebu, Borsdorfskoe, Antonovka 600 g., Uel'si, Osennee polosatae, and Pepin Shafranne. Hybridization of resistant vars. gave the greatest number of resistant progeny. Crossing the resistant *Malus floribunda* and *M. pumila* with cultivated vars. gave the highest number of plants with high resistance.

Gorlenko (M. V.), Ishchenko (L. A.), & Chixnov (E. A.). Культуральная и физиологическая характеристики географических популяций **Venturia inaequalis Ad.** и **Venturia pirina Fuck.** [The cultural and physiological characters of geographical populations of *V. inaequalis* and *V. pirina*.] Науч. Докл. высш. Школ. [*Nauch. Dokl. vŷssh. Shkol.*], Ser. biol. Sci., *1959*, 1, pp. 88–92, 1959.

V. inaequalis on apple and *V. pirina* on pear [cf. **37**, 337] occur in nearly all fruit growing areas of the Soviet Union, though in some places they have only been observed comparatively recently. Conidial populations from different areas gave colonies which differed in growth characteristics and in some of their physiological properties. There was a greater difference between the geographical populations of each species than between the 2 spp. from the same area.

On saccharose peptone agar at 20° C. after 12 days *V. inaequalis* from Kishinev was easily distinguishable by the closely appressed mycelium and its more singletoned tobacco colour, only changing to olive towards the edges. The Barnaul population was characterised by slower growth, very dense velvet mycelium, and unequal edges. The Maikop and Voroshilov isolates were downy, colouring the medium brownish. Sugar was the main carbohydrate used by all populations, with individual preferences for different types. All made excellent use of organic and inorganic N sources, growing best on asparaginic acid, peptone, and ammonium sulphate. Natural sap of carrot and apple and also vitamins increased mycelial growth of all. The Barnaul population reacted especially sharply to the growth factors, mycelial wt. increasing 2·2 times with the addition of apple sap, compared with 1·3–1·5 times in the other strains. With carrot sap the increase of Barnaul was 5 times. Optimal stimulation was obtained with vitamins C and B_1; Barnaul reacted most intensively, mycelial wt. increasing 4·4 times with vitamin C, and 3 times with B_1 and B_2. Mycelial growth of all strains was also stimulated by malic acid, yield increasing as more acid was added in relation to glucose. The Barnaul strain differs physiologically from the others; it is thought that it may be a form parasitizing wild apples (in Kazakhstan and other adjacent regions) and not cultivated apples.

Hockey (J. F.). **Calyx-end rot of Apples.**—*Plant Dis. Reptr*, **43**, 7, pp. 804–805, 2 fig., 1959.

This disease, caused by *Sclerotinia sclerotiorum*, is described from the Canada Dept Agric., Kentville, Nova Scotia. Dark brown lesions appear in the calyx basin soon after bloom, expanding later to form a cavity covered by desiccated, rotted tissue. As the fruit ripens the rot becomes active, and its development resembles that of the *Botrytis cinerea* rot described by Wilkinson [**23**, 26]. Sclerotia develop on fallen fruit and fructify in the following spring. Apothecia were found in all grass-mulch orchards in which the disease had been reported the previous season but not in an orchard under clean cultivation. The vars. McIntosh and Red Rome Beauty were the worst affected.

Jovićević (B.). **Neka zapažanja o šarki Šljive u Kosovsko-Metohiskoj oblatsi.** [Some observations on Plum pox in the Kosovo-Metohija region.]—*Zash. Bilja* (*Plant Prot., Beograd*), *1958*, 46, pp. 17–25, 3 pl., 1958. [Engl. summ. Received Aug. 1959.]

Investigations by the Inst. for Plant Diseases, Péc, Yugoslavia, in 1953–56, showed that plum pox virus [**37**, 542] infected 40% of the plum trees in the Kosovo-Metohija region. The most susceptible var. was Požegača; Šarica and Moravka were less severely affected and the virus was seldom found on Džanarica plum or on apricot. Altitude had little or no effect on severity of infection, which occurred above 1,000 m., neither had age of the tree. Spread occurs mainly in infected shoots and to a lesser extent in nursery seedlings though there are examples of sporadic outbreaks in some very old orchards.

Khristov (A.). Проучванията върху болеста шарка по Сливите и възможностите за борба с нея. [Investigations on Plum pox disease and possibilities for its control.]—Овощарство [*Ovoshtarstvo*], **6**, 7, pp. 28–32, 1959.

This is a detailed account of plum pox [**37**, 411 : cf. **38**, 216], 1st recorded in Bulgaria in 1915 and very widespread in the west by 1936. Seven other virus diseases of stone fruits often confused with plum pox are listed; plum line pattern virus was probably introduced from France on the Blan apricose plum var. Plum pox may appear in several forms: severe infection of both leaves and fruit, as on the Blue Kyustendil and Tzar Dushan; severe pox on the leaves with slight effect on the fruit and that only in the 1st few yr. after infection (Green Reine Claude, Red Afez, and White Afez); slight symptoms on the leaves, but fruit not affected (Yellow Afez, Early Red English, Graf Altan, Queen Ivazonska, Mirabelle, and Belgian Big); slight symptoms on the leaves and fruit only in the 1st few yr. after infection; and no leaf symptoms but occasional fruit symptoms. The only var. which after infection developed no symptoms on leaves or fruit was Mirabelle from nurseries in Provadija, Tergovishte, and Zlatitsa. A similar range of symptoms was found on different apricot vars.

In regions where the commercially valuable but highly susceptible Blue Kyustendil is grown resistant vars. should be planted, the best being Early Red English, Monforska, Belle Louvaine, Green Reine Claude, and Yellow Afez, which are also resistant to rust [*Tranzschelia pruni-spinosae*: **37**, 539].

Gualaccini (F.). **Una virosi dell' Albicocco.** [A virus disease of Apricot.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **16** (*1958*), 1, pp. 55–65, 4 pl. (19 fig.), 1959. [Engl. summ.]

This paper has already been noticed [**38**, 357].

Zuckerman (B. M.). **Fusicoccum canker of the highbush Blueberry in Massachusetts.**—*Plant Dis. Reptr*, **43**, 7, p. 803, 1959.

A report of the occurrence of *F. putrefaciens* on *Vaccinium corymbosum* [**37**, 728]

in Mass., where the disease was 1st found in 1957 and appears to be spreading. Sporulating pycnidia are found during March–July.

Smol'yaninova (Mme N. K.). Болезни Малины. [Diseases of Raspberries.]—*Sad i Ogorod*, **96**, 8, p. 72, 1958.

In recent years in the U.S.S.R. virus and other diseases of raspberries have become so widespread that some plantations have had to be completely uprooted. Frequent cases of witches' broom have occurred in the Moscow area. The number of thin non-fruit bearing shoots increases, while their height is reduced to 25–40 cm. The urgency of control measures is stressed.

Natal'ina (Mme O. B.). О новом типе поражения культурной Малины грибом **Phragmidium rubi idaei Karst.** [On a new type of infection of the cultivated Raspberry by the fungus *P. rubi-idaei*.]—*Bot. Mater.* (*Notul. syst. Sect. crypt. Inst. bot. Acad. Sci. U.S.S.R.*), **12**, pp. 233–237, 3 fig., 1959.

When studying the raspberry rust *P. rubi-idaei* [**38**, 155] the author observed two types of stem infection, not previously mentioned in the literature and of considerable economic significance—infection at ground level and direct stem infection. In the former the young stem is infected as it passes through a considerable layer of detritus of old leaves, the greatest infection being caused by direct contact: 70–110 separate foci may occur in a small area of the young stem, and a mass of small orange spermogonia appear. These are initially covered by the epidermis, but later erupt to cover the whole infected part of the stalk with a sticky mass drying to a shiny film. The development of caeomata follows, the individual lesions coalesce, and the stem tissue between them turns brown and dies. In the course of time infection of the lower part of the stem becomes general. At the sites of max. accumulation of infection foci or of the worst wounds, the stem becomes flattened. In the following year, when shoot growth continues, the infected lesions are deeply cracked longitudinally.

Lebezhinskaya (Mme L. D.). Пурпуровая пятнистость стеблей Малины, вызываемая грибом **Didymella applanata (Niessl) Sacc.** в условиях Ленинградской области. [Purple spotting of Raspberry stems, caused by the fungus *D. applanata*, in the Leningrad region.]—*Bot. Zh. S.S.S.R.*, **44**, 5, pp. 693–696, 1 fig., 1959.

During investigations in raspberry plantations in 1953–56 the disease was found together with anthracnose (*Gloeosporium venetum*) [*Elsinoe veneta*], white spot (*Septoria rubi*), and rust (*Phragmidium rubi-idaei*) [cf. above]. Following inoculation of 5 samples of canes with ascospores of *D. applanata* all developed purple spots similar to those in nature. They originally measured 0·5–1 cm., growing in 16 days to 2–3 cm., and later covering the cane, the light yellow centre bearing fruit bodies. After overwintering perithecia of *D. applanata* were noted.

Goidanich (G.) & Canova (A.). **La degenerazione da virus della Fragola.** [Virus degeneration of the Strawberry.]—*Progr. agric., Bologna*, **5**, 7, pp. 751–764, 24 fig. (6 col.), 1959.

The authors describe a wilt or dying-off of strawberry plants prevalent in Emilia and other parts of Italy, resembling that caused by a complex of viruses in other countries. It was transmitted from Mme Moutot to *Fragaria vesca*.

A brief account is given of the experimental production of virus diseases of the strawberry, and the paper concludes with an outline of work on virus degeneration of this host being carried out at the University of Bologna.

Potapov (S. P.). Сортоиспытание Земляники в Московской области. [Strawberry variety trials in the Moscow area.] *Sad i Ogorod*, **96**, 6, pp. 46–47, 1958.

During 1951–58 at the Kolomenskiĭ agric. Tech. Sch., Moscow, *Botrytis cinerea* [cf. **38**, 218] occurred on most of the tested vars. (11 from the Moscow Berry-fruit Res. Sta. and exper. Base, VIR, and 6 from the Moscow Vegetable-seed-selection Breeding Sta.), especially when rainy and cold weather prevailed at picking and prevented strawing. In rainy conditions, infection in Krasavitsa Zagor'ya was 14% and in Komsomolka 10%. Pavlovskaya Krasavitsa, Leningradskaya pozdnyaya, and Pozdnyaya iz Pavolvska were highly resistant. On the basis of 5 yr. observations, Komsomolka, Krasavitsa Zagor'ya, Pozdnyaya iz Zagor'ya, Novinka, Roshchinskaya, and Pavolvskaya Krasavitsa are most recommendable from every point of view.

Rai (J. N.). **Studies in the diseases of Mangifera indica Linn. Girdle necrosis—a variation from typical Mango necrosis.** *Indian J. agric. Sci.*, **28**, 2, pp. 243–247, 1 pl. (6 fig.), 1958.

The initial symptoms of a non-pathogenic girdle necrosis of mango fruits (vars. Dasehri, Safeda, and Khasli) discovered in orchards near Lucknow, associated with typical necrosis [**30**, 174], though much rarer, are small, isolated, etiolated areas near the distal end in the sinus area, associated with deformation of the basal part. Brown spots develop in the etiolated regions, and coalesce to form dark brown, necrotic areas, as in typical necrosis, which extend into a depressed girdle, delimiting the green tip. Growth is retarded and the fruit does not ripen properly. In the final stages the green tip also becomes necrotic and the seed protrudes beyond the flesh as in typical necrosis. The earlier stages of girdle formation are accompanied by the gradual disintegration of mesocarp tissues beneath the lesions and the formation of cavities.

Stone (W. J.) & Culp (T. W.). **Effects of diseases on Castorbeans in Mississippi.**—*Plant Dis. Reptr*, **43**, 7, pp. 827–829, 3 fig., 1959.

Notes are given from the U.S. Dept Agric. and the Miss. agric. Exp. Sta., Stoneville, on diseases of *Ricinus communis* [**33**, 631; cf. **38**, 295], which became more serious in the wet years 1957–8. The most damaging are capsule mould (*Alternaria ricini*), which may cause almost total loss of yield of susceptible vars. (e.g. 99 lb./acre from var. US 65 in 1958 compared with 3,148 in 1956), and grey mould (*Botryotinia* [*Sclerotinia*] *ricini*) [**38**, 613], which increases with continuous cropping and may affect 25% of the racemes in a planting. *A. ricini* on leaves is of minor importance. Other less severe diseases are bacterial leaf spot (*Xanthomonas ricinicola*), to which many lines are resistant, leaf spot caused by *Cercospora ricinella*, and a wilt, similar to that caused by *X.* [*Pseudomonas*] *solanacearum* [**1**, 202], which was severe in some areas.

Zarzycka (Hanna). **Odporność niektórych odmian Racznika (Ricinus communis) na grzyb Botrytis cinerea Pers.** [The resistance of some Castor varieties (*R. communis*) to *B. cinerea*.] **Wpływ niektórych fungicydów na grzybnię i zarodniki grzyba Botrytis cinerea Pers., powodującego szarą pleśń Racznika (Ricinus communis).** [The influence of some fungicides on the mycelium and spores of *B. cinerea*, the causal agent of grey mould of *R. communis*.] - *Acta Agrobot.*, **7**, pp. 117–124, 125–130, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 13, p. 196, 1959. Engl. summ.]

In studies [cf. **36**, 727] at the Plant Protection Inst., Reguly, Pleviskiĭ was the most susceptible of the vars. cultivated in Poland and Pulavskiĭ the most resistant. No correlation was demonstrated between plant colour, spinelessness of fruit, and resistance to the fungus. Vars. with a dense inflorescence are the most susceptible.

Thiram (2%) and thiovit (0·75%) were highly inhibitory to *B. cinerea* mycelium.

Balasubramanian (M. A.). **A note on the occurrence of little leaf in Clove.**—*Indian J. agric. Sci.*, **28**, 4, pp. 567–568, 1 fig., 1958.

This disease, probably of virus origin, was found in 1955–6 affecting a 25-yr.-old tree in the Kanyakumari district of Madras. It caused a complete repression of all tree and vegetative characters. The branches grew at an acute angle, giving the tree a cone-shaped appearance. Leaves were reduced in size from the base to the apex of a shoot; internodes were shortened; primary and secondary branches were also arranged closer and became shorter towards the periphery of the tree. The tree failed to flower, and its trunk bore numerous protuberances. Similar symptoms had been observed previously in an old plantation on 3 trees which were loop-rooted with characteristic goose-neck formation.

Varma (P. M.) & Capoor (S. P.). **Mosaic disease of Cardamom and its transmission by the Banana aphid Pentalonia nigronervosa Coq.**—*Indian. J. agric. Sci.*, **28**, 1, pp. 97–107, 3 fig., 1958.

The mosaic virus of *Elettaria cardamomum* [**37**, 104] was shown to be non-persistent in the vector, *P. nigronervosa*, which usually breeds on bananas (grown extensively in spice gardens) and also on cardamom during winter. The disease renders cardamom plantations commercially useless within 3 yr.

Thomas (C. A.). **Control of pre-emergence damping-off and two leaf-spot diseases of Sesame by field treatment.**—*Phytopathology*, **49**, 8, pp. 461–463, 1959.

Of the materials tested in the greenhouse and field at Beltsville during 1954–58 orthocide 75 at $\frac{1}{4}$-2 oz./bush. gave the best control of pre-emergence damping-off of sesame seedlings, associated predominantly with isolates of *Pythium ultimum*, and at a max. at 20° C. In a typical field trial the mean percentage stand was increased from 4·8 in the untreated to 34·8. This and other seed treatments also reduced the development of *Alternaria* leaf spot [cf. **28**, 6], severe infection not occurring until after flowering. Bacterial leaf spot (*Pseudomonas sesami*) [cf. **9**, 698; **26**, 531] was significantly reduced by seed treatment with streptomycin at 250–1,000 p.p.m. The trials were run in naturally infested, moist soil.

Rozsypal (J.). **Poznámky k virosám Máku setého.** [Observations on the viruses of opium Poppy.]—*Čes. Biol.*, **6**, 6, pp. 438–440, 1 pl., 1957. [Russ., Germ. summ. Received July 1959.]

In this hitherto unknown disease of opium poppy, 1st observed in the Kroměříži region, Czechoslovakia, the initial symptoms are a yellowing of the plant and a thin, elongated stem; buds and the capsule often split longitudinally and the terminal leaves are dwarfed and deformed; the swollen placenta bears undeveloped and sterile seeds. Subsequently the yellow colour becomes deeper and the capsule further deformed, with further longitudinal splitting to give a starlike form, with shedding of the capsule walls. Yellow-greenish spots on the leaves, stem, and petals give a mosaic appearance; upper internodes are shortened in severe cases with general dwarfing, giving a broom-like appearance.

Orian (A. J. E.). **Report on a visit to Diego Garcia.** -*Rev. agric. sucr. Maurice*, **38**, 3, pp. 127–143, 1 pl., 4 fig., 1959.

In a note on the diseases of coconut palms (pp. 133–134) it is stated that bud rot [*Phytophthora palmivora*] occurs but is not common. Stem rot and stem bleeding (*Ceratostomella* [*Ceratocystis*] *paradoxa*) [cf. **33**, 412; map 142] are widespread, but 'little leaf' was not observed. Marked yellowing of uncertain cause, either of individual palms or of groups, occurs in several places. *Pestalotia palmarum* [loc. cit.] is frequent on leaves and may blight young seedlings. Tapering stem wilt or pencil point disease [loc. cit.] was also seen.

Матеев (А.). Почистване и апробация на Картофените семенни участъци. [Cleaning and approval at the Potato seed stations.]—Градинарство [*Gradinarstvo*], **1**, 6, pp. 7–11, 3 fig., 1959.

In the Plovdiv, Stara Zagora, and Pleven regions, Bulgaria, degeneration necessitates renewal of potato 'seed' yearly, or at least every 2 yr. Viruses (mainly transmitted by *Myzodes* [*Myzus*] *persicae*) are chiefly responsible, the most widespread being potato virus X, to which Early Rose is particularly susceptible. Leaf curl virus attacks mainly Bintje; varietal reaction to leaf roll has not been studied in detail. In 1955 $< 5\%$ virus degeneration was detected in Erstling and Bintje imported from Holland because of careful examination at the seed stations; screening all tubers 4 times has been a common practice at the main stations. The 1st roguing of plants with suspected virus symptoms is done when they are 15–20 cm. high, the 2nd 10–15 days later, and the 3rd at flowering, when not only virus-infected but all diseased plants are removed. Black leg (*Bacterium phytophthorum*) [*Erwinia carotovora*] is widespread and must be considered as one of the causes of degeneration in 'seed' crops.

Siemaszko (B.). **Wykrywanie wirusa liściozwoju u Ziemniaków przy pomocy testu rezorcynowego.** [Detection of leaf roll virus in Potatoes by means of the resorcinol test.]—*Hod. Rośl. Aklim. Nasien.*, **3**, 2, pp. 237–247, 13 fig., 1959. [Russ., Engl. summ.]

Resorcinol tests [cf. **35**, 540; **38**, 272, 329] at the Laboratorium Fizjologii Rozwoju Roślin IHAR, Poland, on potato tubers infected with potato leaf roll virus [**38**, 537], indicated that the amount of callose produced varied in different races and vars. As appreciable amounts of callose are found in the vicinity of the stolon scar in healthy tubers, sections for testing should be taken from areas away from the scar. The test is more precise when applied to the stems, but can be used in mass tests on tubers, which in the case of potato lines R. 20033 and 18133 yielded accurate results.

Manzer (F. E.). **Potato meristem culture and virus X.**—*Amer. Potato J.*, **36**, 6, pp. 191–195, 5 fig., 1959.

This information from Iowa State Coll. has been noticed [**38**, 537].

Lovrekovich (L.). **Egyszerű szerológiai mikromódszer a Burgonya X-virus kimutatására.** [A simple serological method for the detection of Potato virus X.]—*Növénytermelés*, **8**, 1, pp. 73–76, 1 fig., 1959. [Russ., Engl. summ.]

In this method, developed at the Res. Inst. for Plant Protection, Budapest, a glass capillary tube 60–70 × 0·5 mm. is filled with immune serum diluted (1 : 10 or higher if necessary) with physiological salt solution and the ends sealed. Sap is expressed from potato leaves by means of a press or 2 glass slides and the capillary tube is broken in the middle, the open end being dipped into the sap and rotated several times. A green disk consisting of chloroplasts and cell fragments forms on the surface of the serum. The tube is kept horizontal for 3–4 min. to enhance the reaction, then placed upright.

With a + reaction the particles which form the green disk gather together and remain on the surface of the serum or, especially with a tube diam. greater than 0·5 mm., form a green bulk and slowly sink into the serum. With a — reaction, as soon as the tube is held upright the particles of the green disk begin to sink and gradually disperse.

As the particles, especially those in the sap of older leaves, can clump non-specifically the test must also be carried out with tubes of normal sera.

Stevenson (A. B.). **A study of the aphid transmission of Potato virus Y in Wisconsin.**—*Diss. Abstr.*, **19**, 11, pp. 2711–2712, 1959.

In 1957 less than 1% potato virus Y infection [**36**, 723] in small plots of Cobbler potatoes in 4 areas of Wisconsin was introduced from outside sources. In plots where a virus source was provided spread was considerably greater at Kenosha than at Rhinelander, Stevens Point, or Madison.

In the greenhouse at the University *Myzus persicae* acquired the virus most readily after making several punctures on infected tobacco, but transmission was diminished by a 15 min. acquisition time. Transmission to tobacco increased slightly with increasing inoculation times, but most of the infective punctures occurred within 5 min. of the aphids being placed on test plants.

Aphids were more efficient in transmitting from tobacco when reared on tobacco than on cabbage, but not from potato. No difference in efficiency could be demonstrated between aphids reared on tobacco and potato. *M. persicae* recovered the virus from aphid-inoculated tobacco leaves after 6 days, from the younger non-inoculated leaves in 8 days, and from sap-inoculated plants in 4 days. From potato the virus was recovered from inoculated leaves in 10–14 days and from non-inoculated in 15–20. Recovery from tobacco was at an earlier date after inoculation by 25 or 10 aphids than by 1 or 2, and the plants inoculated with the larger numbers were subsequently more infective to aphids. The virus moved out of tobacco leaves inoculated with 25 aphids in < 24 hr., and from sap-inoculated leaves in < 48 hr., but not from any leaves inoculated with 10 or 2 aphids until 3 days after inoculation.

Exposure of healthy tobacco plants to sunlight for several hours before aphid inoculation sometimes apparently decreased transmission; exposure immediately after inoculation by aphids making single punctures on the upper surfaces of the leaves also reduced it.

Bagnall (R. H.), Wetter (C.), & Larson (R. H.). **Differential host and serological relationships of Potato virus M, Potato virus S, and Carnation latent virus.**—*Phytopathology*, **49**, 7, pp. 435–442, 3 fig., 1959. [24 ref.]

In joint studies at the Univ. Wisconsin, Madison, Fredericton, New Brunswick, Canada, and the Biologische Bundesanstalt, Brunswick, W. Germany, a comparison was made of virus S [cf. **38**, 764], 6 'types' or 'isolates' of virus M (leaf rolling mosaic, interveinal mosaic [**36**, 779], paracrinkle, D 1102 [**34**, 807], Fortuna, and Bintje), separated from virus S by inoculation of tomato (immune from S) and cultured on Saco potato [**36**, 419], and carnation latent virus (CLV) [loc. cit.], maintained on sweet william (*Dianthus barbatus*). Symptoms on a range of differential hosts are described. CLV produced symptoms only on *D. barbatus*, which appeared immune from the other isolates. Virus S and the M isolates were also compared on 5 potato vars. Serological tests [**38**, 26] showed the M isolates to be closely related, and more distantly so to S and CLV, S and M appearing to be somewhat closer to CLV than to each other. Potato paracrinkle virus, of which virus S has been considered a strain [**35**, 537], is regarded as a synonym of potato leaf rolling mosaic, both diseases being incited by complexes of viruses S and M.

Brandes (J.), Wetter (C.), Bagnall (R. H.), & Larson (R. H.). **Size and shape of the particles of Potato virus S, Potato virus M, and Carnation latent virus.**—*Phytopathology*, **49**, 7, pp. 443–446, 1 fig., 1 graph, 1959.

In further studies [see above] virus S obtained from 4 potato vars. free from other known viruses and 4 isolates of virus M (leaf rolling mosaic, interveinal mosaic, D 1102, and paracrinkle) were used. Electron micrograph measurements showed the 3 viruses to have similar particle lengths (S, 657 (82%); M, 651 (80%); CLV, 652 (68%) mμ) and an estimated diam. of 12–13 mμ. Some double- and half-length particles were also observed.

Bochow (H.) & Raeuber (A.). **Verwechselungsmöglichkeiten der Sporen von Phytophthora infestans (Mont.) de Bary mit anderen Pilzsporen. Beobachtungen bei Sporenflug-Kontrollen im Raum von Mecklenburg.** [Possibilities of confusing the spores of *P. infestans* with other fungus spores. Observations from spore flight checks in the Mecklenburg area.] –*NachrBl. dtsch. PflDienst, Berl.*, N.F., **12**, 12, pp. 234–237, 1 pl., 1958. [Russ., Engl. summ.]

From a study of the literature and examination of spores trapped locally it is suggested that in order to distinguish aerial spores of *P. infestans* [**36**, 782] from those of other Peronosporaceae, especially *Peronospora* and *Plasmopara*, care should be taken to identify the size and shape, the papilla, and a distinct pedicel at the base.

Świniarski (E.), Mierzwa (Z.), & Świszczewska (Mme J.). **Zagadnienie biochemicznej odporności Ziemniaka na zarazę ziemniaczaną (Phytophthora infestans De Bary).** [The problem of biochemical resistance of Potato to Potato blight (*P. infestans*).] *Hod. Rośl. Aklim. Nasien.*, **3**, 3, pp. 393–403, 1959. [Russ., Engl. summ. 19 ref.]

In studies at the IHAR Lab., Gdańsk, Wrzeszcz [**38**, 710], the amount of basic N compounds, including asparagine and glutamine, in potato tubers did not explain the differences in varietal reactions to *P. infestans*. The fall in N content in the leaves at the end of growth was accompanied by decreased resistance to blight and was also affected by the chlorogenic acid content; it was not correlated with tuber resistance. Peroxidase activity [**38**, 619] was similar in vars. of different resistance to blight; high peroxidase activity in 4 wild *Solanum* spp. may be connected with their higher resistance.

Graham (K. M.), Niederhauser (J. S.), & Romero (S.). **Observations on races of Phytophthora infestans in Mexico during 1956–1957.** *Amer. Potato J.*, **36**, 6, pp. 196–203, 1959.

Blighted material received at the Canada Dept Agric., Ottawa, was from potato cultivars and from hybrids between them and *Solanum demissum* under test at the Santa Elena Exp. Sta., Toluca Valley [cf. **33**, 315], as well as material from *S. demissum* growing in its natural habitat in the mountains surrounding the valleys of Toluca and Mexico. Differential potato and tomato hosts, including the single gene series adopted by Black *et al.* [cf. **33**, 250], were inoculated from these sources.

In 1956 a high proportion of races 0, 1, 2, and 4 [cf. **38**, 539] were found on potato vars. lacking genes for resistance to *P. infestans*, while more highly specialized races, such as 1,2,4, 1,3,4, and 1,2,3,4, were obtained from lines of *S. demissum* and from *demissum* × *tuberosum* hybrids. In 1957 races 0 and 4 were isolated from *S. demissum* in the Rio Frio area, and race 0 from an 'r'-type clone of this sp. at Santa Elena.

The occurrence of races 4, 2,4, and 3,4 on certain seedlings of *S. bulbocastanum* resistant to inoculation with race 1,2,3,4 suggests that genes quite distinct from those of *S. demissum* may be discovered in this sp.

Interspecific variation in the degree of field resistance to blight was noted among clones of *S. cardiophyllum*, *S. oxycarpum*, *S. stoloniferum*, *S. demissum*, and *S. bulbocastanum*.

It is suggested that the present international system of nomenclature should eventually be revised to include the race possibilities which may ultimately occur on spp. such as *S. bulbocastanum*, *S. cardiophyllum*, *S. pinnatisectum*, and other Mexican diploids. Tabulated data indicate the heterogeneity of at least 4 Mexican wild potato spp. with respect to field resistance.

Thurston (H. D.), Wilde (P.), & Sudia (T. W.). **Growth of six races of Phytophthora infestans on artificial media.** *Phytopathology*, **49**, 7, pp. 450–451, 1959.

At the Univ. Minn., St. Paul, isolates of races 0, 1, 4, 1,4, 2,4, and 1,2,4 of *P. infestans* [**38**, 619] were cultured at 20° C. on Lima bean agar [**36**, 612] and on a synthetic medium (0·5 g. KH_2PO_4, 0·25 g. $MgSO_4.7H_2O$, 25 g. dextrose, 2·38 g. DL-aspartic acid, 15 g./l. rotted and washed agar, thiamine, 1 p.p.m.) [cf. **37**, 552]. On the latter differences in colony diam. among 6 isolates of race 0 were greater than between the other 5 races (1 isolate each), whereas on Lima bean the opposite occurred. It is concluded that before the ability to utilize specific compounds can be accepted as racial characters many isolates should be studied; many such characters are probably inherited independently of factors governing specific pathogenicity.

Choudhuri (H. C.). **Spray tests for control of Potato blight in the hills of West Bengal. II.** —*Europ. Potato J.*, **2**, 2, pp. 89–99, 12 graphs, 1959. [Fr., Germ. summ.]

In annual blight [*Phytophthora infestans*] control tests since 1952 [cf. **35**, 120], reported from the Dept Agric., W. Bengal, Calcutta, coppesan, copper sandoz, dithane, and perenox were used throughout, supplemented in 1956–7 by Shell copper and copravit [cupravit]. They were applied at 1·25, 2·5, 3, 4, and 5 lb./100 gal. at intervals of 14, 10, 8, or 6 days. Under severe disease conditions control was successful until 136 days after planting in all plots where the interval was 6 or 8 days, and 8 days is taken to be the opt. interval. Highest yields were obtained with cupravit and coppesan; increases in conc. of the fungicides gave progressive increases in yield.

Nikulina (Mme N. K.). Пуговичная гниль клубней Картофеля. [Potato tuber rot.]—Защ. Раст., Москва [*Zasch. Rast., Moscow*], **4**, 2, p. 37, 1959.

Potato rot caused by *Phoma tuberosa* [cf. **36**, 348] is reported from some State farms of the Chitinsk, Uletovsk, and Nerchinsk areas and also from the potato stores of trading organizations in the Chitinsk region. *P. tuberosa* has not previously been observed in the U.S.S.R. Tubers suffering from mechanical damage are most liable to infection.

Menzies (J. D.) & Dade (Caroline E.). **A selective indicator medium for isolating Streptomyces scabies from Potato tubers or soil.**—*Phytopathology*, **49**, 8, pp. 457–458, 1959.

At the Irrigation Exp. Sta., Prosser, Wash., an agar medium containing 2·5% sodium caseinate (dissolved first) +1% $NaNO_3$ and 0·1% tyrosine was found very suitable for isolation of *S. scabies* from soil or potato scab lesions; bacteria are largely suppressed and a distinctive dark brown pigment forms round the colonies [cf. **32**, 33; **35**, 922]. Non-pathogenic actinomycetes do not as a rule produce the pigment and selection in dilution plates is therefore facilitated.

Potter (H. S.), Hooker (W. J.), Cargo (W.), & Stachwick (G. T.). **Pentachloronitrobenzene and urea-formaldehyde for Potato scab control in Michigan.**—*Plant Dis. Reptr*, **43**, 6, pp. 633–637, 2 fig., 1959.

In trials by the Mich. agric. Exp. Sta., East Lansing, control of scab [*Streptomyces scabies*] on Chippewa potatoes in badly infested land in 1955–6 by PCNB [**38**, 29], disked into the soil at planting, was generally poor, though on very sandy soil 45 lb. of 100% active PCNB/acre gave reasonable results. In 1958 PCNB (as terraclor) broadcast at 50 lb. active material/acre and worked in to a depth of 4–6 in. reduced scab incidence consistently. Urea-formaldehyde UF85 [loc. cit.], diluted

1:4 and sprinkled at 150 gal./acre the day before planting, was equally effective. It stimulated yield in some trials, but increased weed development, which appears to be inhibited by PCNB.

Guthrie (J. W.). **The early, dwarf symptom of bacterial ring rot of Potato in Idaho.** —*Phytopathology*, **49**, 7, pp. 453–454, 2 fig., 1959.

This symptom, induced by seed-piece infection by *Corynebacterium sepedonicum* [**37**, 307], and described from Idaho agric. Exp. Sta., Aberdeen, somewhat resembles that of potato yellow dwarf virus [**19**, 39]. Stems from infected eyes produce plants with reduced internodal growth and malformed terminal leaves, which have a velvety texture and sometimes necrotic margins. Wilting and death soon follow. Differences from the virus disease include lack of rugosity of apical leaves and of pith necrosis.

Malcolmson (Jean F.). **A study of Erwinia isolates obtained from soft rots and blackleg of Potatoes.** *Trans. Brit. mycol. Soc.*, **42**, 2, pp. 261–269, 1959. [28 ref.]

At the North of Scotland Coll. Agric., Aberdeen, 134 *Erwinia* isolates from infected potatoes [cf. **32**, 448 *et passim*] were divisible into 3 groups on cultural characters, but not on pathogenicity. Following comparison with named cultures and the descriptions of the spp., 16 isolates were considered to represent *E. carotovora*, 114 *E. atroseptica*, and 4 *E. aroideae*. Earlier references to the similarity of these spp. are reviewed. Differences in response to temp. and forms of N in the medium, the action of the spp. on ethyl alcohol, maltose, and glycerol, with particular reference to the effect of the basal medium employed, were studied. It was concluded that tests for growth on special compounds (such as those mentioned) should be made with an inorganic basal medium instead of nutrient broth or peptone, metabolic products of which could mask the reaction. Some serological tests were also made [cf. **21**, 325].

Srivastava (D. N.) & Walker (J. C.). **Mechanisms of infection of Sweet Potato roots by Rhizopus stolonifer.** *Phytopathology*, **49**, 7, pp. 400–406, 2 graphs, 1959.

Further studies at the Univ. Wisc., Madison [cf. **38**, 462], showed that sweet potato roots could be conveniently inoculated by removal of a plug of tissue, insertion of young, actively growing aerial hyphae of *R. stolonifer* [cf. **38**, 711] from a potato dextrose agar culture, replacement of the plug, and incubation at 20° C., the opt. temp. for disease development, though the fungus grew best at 28°. Macerating activity of extracts from tissues 6 days after inoculation, tested on carrot sections, and activity of pectin methyl esterase and polygalacturonase, measured by the methods of Winstead and Walker [**33**, 747], were all max. when the roots were kept at 20°; on PDA, however, pectolytic action is not necessary to provide carbohydrates and growth rate is apparently determined by other metabolic activities for which 28° is opt. The disease progressed equally well at R.H. 95–100, 75–85, and 50–60%; humidity is necessary for initial infection, but is provided by the cell sap in newly cut tissue.

Lack of aeration in closed chambers or plastic bags checked disease progress, but the resultant accumulation of moisture initiates rotting and causes abundant surface mould growth. Spores alone as inoculum were unable to induce the disease in newly harvested sweet potatoes, even with the addition of glucose, though they caused some infection in those stored for several months. Addition of pectolytic enzymes to the inoculum resulted in rotting after 10 days, by which time colonies had been formed and produced infective hyphae. Infection was slightly reduced by the degree of suberization of wounds occurring in 3 days, and more so after

7 days. The crust formed over wounds of long standing, however, gave complete protection.

It was shown that in nature infection occurs at the spindle ends of the tuber, where saprophytic growth of the fungus on the dead tissue allows development of the infective hyphae necessary to parasitize the healthy tissue. Removal of the tips before exposure to inoculum almost eliminated infection, whereas artificial crushing of the terminal 1 cm. augmented it.

RIGGENBACH (A.). **Antimucin—a new water miscible fungicide for the control of black stripe.**—*Quart. J.* (formerly *Circ.*) *Rubb. Res. Inst. Ceylon*, **35**, 1, pp. 8–9, 3 pl., 1959.

In laboratory tests with numerous fungicides the mercury-based preparation antimucin was the most effective against *Phytophthora palmivora* in corn meal agar cultures [**38**, 99]. In large-scale field tests against panel diseases of *Hevea* rubber the product was extremely effective; its cellulose-fixing properties prevent it from being washed off by rain. It should be used at 1 in 160 (1 fl. oz. 1 gal. of water) to 1 in 320, according to the severity of infection and the weather conditions. It is best brushed on the panel immediately above the cut at each tapping, before removing the scrap. When the risk of infection is less, application may be made at every 2nd or 3rd tapping only.

TOLLENAAR (D.). **Rubber growing in Brazil in view of the difficulties caused by South American leaf blight (Dothidella ulei).** —*Netherlands J. agric. Sci.*, **7**, 3, pp. 173–189, 10 fig., 1959.

The climate of the Amazon area of Brazil is so favourable to *D. ulei* [cf. **33**, 560; **37**, 506] that in monocrop rubber plantations only the most resistant selections survive; in the natural forest where the trees are isolated the disease is less severe. In S. Bahia, where the disease is not so favoured, it is possible to lay more emphasis on high yield, and less on resistance. The disease is absent from São Paulo, but the chance of its becoming established by wind-borne spores increases with the acreage under rubber. No susceptible trees should be planted there, the choice of material recommended being the same as for S. Bahia. Planting of '3-component' trees (i.e. a high-yielding panel clone top-budded with a resistant crown) is not practical, owing to the detrimental effect of top-budding on yield. The most productive resistant clones have in general a less depressing effect than the least productive types, but it is best, both for simplicity and on account of the higher yields, to use the former as single budgrafts, rather than as crown buddings, on Eastern tapping panel clones. The choice of planting material in Brazil is at present restricted to highly resistant clones such as FX 25, FX 3844, IAN 710, and IAN 873, concerning the performance of which very little is known, or tolerant, high yielding Eastern clones with limited resistance, such as PB 86 and AV 1301, or, finally, seedling plantations of selfed PN 86 and AV 1301, having a certain measure of resistance.

ABBOTT (E. V.). **Diseases in relation to variety planting in 1959.**—*Sug. Bull., N. Orleans*, **37**, 21, pp. 272–273, 283–284, 1959.

Based on Houma Sta. records, the max. percentages of sugarcane mosaic virus in 7 C.P. vars. and 1 N.Co. released for cultivation in Louisiana [**38**, 277] were as follows in (*a*) test and (*b*) commercial fields: 36–13, 2 and trace, respectively; 36–105, 11 and 25; 44–101, 32 and 75; 44–155, 18 and trace; 47–193, 2 and trace; 48–103, 10 and 10; 52–68, 43 and 35; and N.Co.310, 59 and 90.

C.P.36 13 and 44–155 produced on an av. 7 and 11% less sugar/acre, respectively, than C.P.44–101 in the 5 test fields in the Bayou Lafourche-Mississippi River area, and their eventual substitution for C.P.44–101 or N.Co.310 should be regarded as a temporary expedient to reduce the mosaic hazard rather than a means

towards increased output. C.P.47–193 has yielded only 3% less sugar on light soils and 2% on heavy than C.P.44 101 in the same fields and would be an excellent substitute for susceptible vars. except for a relatively high sucrose inversion rating (4·7), which impairs its keeping qualities. The comparatively slow spread of infection into the early-maturing C.P.48-103 could probably be controlled by roguing. This var. produced 11% less cane acre than C.P.44–101 in the same area but its sugar yield is 8% higher on light soils.

Further investigations on the rate of spread of mosaic in N.Co.310, C.P.44 101, and C.P.52–68 confirmed the previous observation [loc. cit.] as to its greater rapidity in N.Co.310. In Apr. 1959 surveys of C.P.44 101 cane grown from mosaic-free seed and rogued in 1958 revealed only 1% infection, rising to 1·5% by late June. In C.P.52–68, also rogued in 1958, the av. infection in Apr. 1959 was 7%, increasing to 9·5 in June, while in N.Co., under comparable circumstances, incidence rose from a trace in spring 1958 to over 40% in late June 1959. It is evident from these data that the continued cultivation of N.Co.310, despite its satisfactory performance even when moderately to heavily infected, will complicate the work of control, especially in C.P.52–68, the best of all the released vars. from the standpoint of sugar yields in the Bayou Teche and Lafayette areas as well as those mentioned above.

With the discontinuance of large-scale cultivation of C.P.29–320, the prevalence of chlorotic streak virus has declined except in N.Co.310 in the S.E. of the State. Infection may be eliminated from seed cane by the heat treatment applied against [ratoon] stunting virus [**38**. 277], as well as by 20 min. in water at 125–126° F. However, reinfection tends to occur rapidly, as demonstrated by the presence of 10% in May 1959 in a field planted with heat-treated N.Co.310 seed cane.

Chona (B. L.) & Seth (M. L.). **Aphis maidis Fitch as vector of Sugarcane mosaic in India.**—*Indian J. agric. Sci.*, **28**, 2, pp. 257–260, 1958.

At the Indian agric. Res. Inst., New Delhi, sugarcane mosaic virus was experimentally transmitted by *A. maidis* [cf. **37**. 181] from infected sugarcane and sorghum to the sugarcane vars. Co.313 (27·2% infection) and Surkha Saharanpuri (55·3%). Two other vars. were not infected, possibly because the aphid could not pierce their coarser leaves.

Bird (J.), Viadé (H. C.), & Tió (M. A.). **Transmission of the causal agent of the chlorotic streak disease of Sugarcane through the roots of plants grown in nutrient solution.** *Tech. Pap. P.R. agric. Exp. Sta.* 27, pp. 5–17, 1958. [*Biol. Abstr.*, **33**, 10, p. 3204, 1959.]

The extreme seriousness of chlorotic streak [virus] disease of sugarcane in the humid northern coastal plain of Puerto Rico [**38**. 768] in spite of the failure to secure insect transmission, and the development of symptoms in plants grown in sterilized soil and watered minimally, was explained by experiments in which transmission was secured by contact between healthy and diseased roots, and even by circulation of the nutrient solution in the absence of direct contact.

Kandasami (P. A.) & Vijayalakshmi (U.). **Puccinia erianthi, Padw. and Khan on cultivated Sugarcane.**—*Curr. Sci.* **28**, 5, pp. 209–210, 4 fig., 1959.

The occurrence of *P. erianthi* [**35**, 791] on Co.1191 and Co.1243 is reported from Coimbatore, India. The rust as found is described and comparisons with *P. kuehnii* [loc. cit.] are tabulated.

Rao (G. N.) & Vijayalakshmi (U.). **A note on the occurrence of certain parasitic fungi on insect pests of Sugarcane.**—*Curr. Sci.*, **28**, 7, p. 295, 1959.

At the Sugarcane Breeding Inst., Coimbatore, it was observed that *Aspergillus*

parasiticus [cf. **32**, 303], *Metarrhizium anisopliae* [cf. **36**, 527], and *Beauveria bassiana* were able to parasitize a number of sugarcane pests including mealybugs (*Saccharicoccus sacchari*), *Lacnosterna consanguinea*, grasshoppers, etc.

Abe (T.), Kono (M.), & Takaya (S.). **Studies on the anthracnose of Tea bush. III. On the sporulation and germination of conidia of anthracnose fungi.**—*Sci. Rep. Fac. Agric. Saikyo Univ.* 10, pp. 68–76, 1 pl. (5 fig.), 1958. [Jap. Abs. from Engl. summ. Received 1959.]

Further investigations [cf. **37**, 182] of 4 fungi isolated from the leaves of tea showed that *Gloeosporium theae-sinensis* sporulated most rapidly and produced comparatively numerous conidia in a medium from autoclaved tea leaves. Max. percentage germination of conidia on tea leaf extract (4 g. tea leaves 100 ml. water for 1 hr.) was approx. 95 and on apricot extract (2·5 g. dried apricots) 55. Opt. temp. for germination was 24–28° C., but even at 20 and 32° more than 50% germinated. When conidia on autoclaved leaves germinating 75–85% were incubated at 4–2° in a refrigerater, germination was reduced to 39·9% within 5 days and to 1·3% in 20 days.

Glomerella cingulata and *Guignardia camelliae* sporulated with or without sunlight (though more rapidly without) at 20–30°, and more so on corn extract than on potato extract, but *Glomerella* sp. also isolated from lesions required sunlight, though sporulating in a room in mid-summer. Germination of conidia of *G. cingulata* in tea leaves extract and distilled water was above 95% and was highest in a 60-day-old culture; that of *Guignardia camelliae* and *Glomerella* sp. below 20%. The conidia of *G.* sp. became multiseptate on germination.

Vorontsev (V. V.). О корневых волосках и микоризе у Чайного растения. [On root hairs and mycorrhiza of Tea plants.]—*Agrobiology, Moscow, 1959*, 4, pp. 626–628, 1959.

In studies of the root system of tea plants in Georgia, U.S.S.R., it was found that tea roots have very few root hairs (69–132/cm. root) compared with other plants, e.g. apple (1189–2951/cm. root), except in very young plants in culture. This suggests that tea plants receive much of their nutriment from the superficial roots and are helped by mycorrhiza [cf. **7**, 604; **8**, 456; **19**, 369; **33**, 54]. Pale to dark yellow hyphae were constantly observed. Only a negligible fluctuation in the amount of mycorrhiza present occurred in different seasons. In the soil from under tea plants similar hyphae, with the same colour and dimensions (6–8 μ) as in the root, were found and an atypical ectoendotrophic mycorrhiza is believed to be present.

Chenery (E. M.) & Shoenmaekers (J.). **Magnesium deficiency in East African Tea.**—*E. Afr. agric. J.*, **25**, 1, pp. 25–27, 1959.

On the western shores of Lake Kivu, Belgian Congo, in 1958, Mg deficiency symptoms similar to those observed in coffee [**37**, 661] were found on tea bushes which for the most part did not otherwise appear unthrifty. The symptoms were confined to large, mature leaves, analysis of which gave a content of less than 0·2% Mg (dry wt. basis) and a K/Mg ratio above 10, as for coffee. This is the 1st record of Mg deficiency of tea grown in Africa [cf. **34**, 551].

Nikiforova (Mme G. S.). Простой метод очистки вируса Табачной мозаики. [A simple purification method for Tobacco mosaic virus.] –Биохимия [*Biokhimiya*], **24**, 3, pp. 432–434, 1959. [Engl. summ.]

At the Inst. Genetics, Moscow, a simple method of purification was found equally effective for a single infected leaf or several l. of sap. Crystalline ammonium sulphate is added at 20% to the infected sap. The supernatant is poured off and the

sediment, consisting of cell material and virus, is transferred to filter paper, washed with more solution (10–20%), and irrigated with water. The virus, highly soluble in water, passes into the filtrate. Crystalline ammonium sulphate is then added until the virus salts out. This preparation still contains cell nucleoproteins. To remove these, the virus residue after the 1st salting out is dialysed against running tap water, the precipitated cell nucleoproteins are filtered off, and the filtrate used for experiments. If the virus preparation thus obtained is to be stored, it must be again precipitated with ammonium sulphate.

Shepherd (R. J.). **The influence of boron and magnesium nutrition of Nicotiana tabacum L. on the multiplication of Tobacco mosaic virus.** —*Diss. Abstr.*, **19**, 12, p. 3102, 1959.

Estimation of infectivity of expressed sap and the ultra-violet light absorbancies of purified virus preparations were used at the Univ. Wisconsin to test the effect of B and Mg [cf. **37**, 278, 508] on the multiplication of tobacco mosaic virus in Havana 38 tobacco. There was less virus in B deficient plants for 1–2 weeks following inoculation, probably because of poorly functioning phloem or lack of spread in conjunction with the non-translocated products of photosynthesis. The difference disappeared after longer periods and the conc. of virus in deficient plants even exceeded that in non-deficient. Mg deficiency limited virus multiplication, but the differences were not always great even in plants showing deficiency; the reducing effect on host growth was greater than on virus multiplication.

Yamaguchi (A.) & Hirai (T.). **The effect of local infection with Tobacco mosaic virus on respiration in leaves of Nicotiana glutinosa.**—*Phytopathology*, **49**, 7, pp. 447–449, 2 graphs, 1959.

At Nagoya Univ., Anzyo, Aichi-ken, Japan, the respiration of half-leaves of *N. glutinosa* inoculated with tobacco mosaic virus [cf. **37**, 678; **38**, 626] was compared with that of healthy halves. At 25° C. local necrotic lesions became visible about 36 hr. after inoculation. Before their appearance the respiratory ratio of inoculated to uninoculated tissues was 1; subsequently it increased gradually, reaching 1·2–1·4 on the 3rd day and then declining on the 4th nearly to 1. At 20° the lesions became visible 40 hr. after inoculation, enlarged more slowly, and the respiratory ratio increased from their appearance until the 4th day. At 25° the respiratory quotient on the 3rd and 4th days was nearly the same in both inoculated and uninoculated half-leaves. The virus content of inoculated leaves at 20°, as judged by infectivity of extracts, decreased at first, then after about 30 hr. rose rapidly until the appearance of lesions, the increase ceasing about 48 hr. after inoculation [cf. **36**, 171]. It is possible that the increased respiration may not be related to the virus content, but may reflect the development of local necrotic lesions.

Bovȳr' (A. D.). Влияние алкалоидов на некротическую реакцию, вызываемую вирусом Табачной мозайки. [The influence of alkaloids on the necrotic reaction, caused by the Tobacco mosaic virus.] Воп. Вирусол. [*Vop. Virusol.*], *1959*, pp. 363–366, 1959. [Engl. summ.]

At the Inst. Microbiol., Ukrainian Acad. Sci., Kiev, 23 of 61 alkaloids tested inhibited the necrotic reaction caused by tobacco mosaic virus in *Nicotiana glutinosa* and *Datura stramonium* [cf. **33**, 763]. Most effective were quinine hydrochloride, diuretin, lycopodine, spherophysin, and pseudoephedrine, giving 61–92% inhibition. Homoxelodine, loline hydrochloride, and spherophysin, following 15–20 min. treatment of the virus in expressed tobacco sap, gave 144–158% stimulation to the formation of necroses in isolated leaves. None inhibited necrotic reaction when used 24 hr. after infection, but quinine hydrochloride, diuretin, delsemidine, papaverine sulphate, and laziocarpine gave 150–405% stimulus.

Brčák (Y.). Отношение насекомых к вирусу Табачной мозаики. [The relationship of insects to Tobacco mosaic virus.]—Воп. Вирусол. [*Vop. Virusol.*], **4**, 2, pp. 171–176, 4 fig., 1959. [29 ref.]

This paper from the Dept Phytopath., biol. Inst., Czechoslovakian Acad. Sci., Prague, reviews both bibliographical and experimental data on the absence of random and obligate insect vectors of tobacco mosaic virus [cf. **37**, 247]. The author concludes that the facultative transfer of the virus by insects with biting mouth parts occurs mainly by contact, though this applies to highly infectious viruses only. The relationship between insects and tobacco mosaic virus is one of the most primitive. Transfer by contact evidently plays no role in the development of interrelationships of phytopathogenic viruses and insects and their adaptation.

Sukhov (K. S.). **Phases in development of phytopathogenic viruses.** –Abs. in *Proc. 10th int. Congr. Genet.*, **2**, p. 281, 1958.

It is reported from the Inst. Genetics, Acad. Sci., Moscow, that initially tobacco mosaic virus exists vegetatively within the host, i.e. non-infective virus diffuses through the plant. This is not precipitated by resting-virus antiserum and the infected cells contain amorphous X-bodies. During the transition into the resting phase, which can be prevented by high temp. and the absence of light, the virus particles exhibit high but unstable virulence, and are precipitated by antisera produced against virus of mosaic infected leaves. If the transition is prevented transformation to the infective form can be restored after 1½–2 hr. exposure to opt. conditions. In the final stage rod-like particles of stable virulence are formed. The variability of the virus caused by high temp. is related to the vegetative phase.

Kassanis (B.). **Comparison of the early stages of infection by Tobacco mosaic virus and its nucleic acid.**—*J. gen. Microbiol.*, **20**, 3, pp. 704–711, 1 graph. 1959.

This is a detailed account of work already noticed [**38**, 649].

Bawden (F. C.) & Kleczkowski (A.). **Photoreactivation of nucleic acid from Tobacco mosaic virus.**—*Nature, Lond.*, **183**, 4660, pp. 503–504, 1959.

It was demonstrated at the Rothamsted Experimental Station that the nucleic acid of tobacco mosaic virus, irradiated with ultra-violet light when freed from its protein, could be photoreactivated. *Nicotiana glutinosa* plants rendered highly susceptible to infection by intact virus and even more so to nucleic acid by raising in shade at 37° [C.] for a day before inoculating were used for estimating infectivity of the virus and nucleic acid. Photoreactivation occurred when separated nucleic acid was irradiated, but not when intact virus was, whether the inoculum was intact virus or nucleic acid separated from the irradiated virus.

Siegel (A.), Norman (A.), & Ginoza (W.). **The inactivation of Tobacco mosaic virus by ultraviolet light.**—Abs. in *Proc. 10th int. Congr. Genet.*, **2**, p. 261, 1958.

At the University of California, Los Angeles, infectious nucleic acid from tobacco mosaic virus strains U1 and U2 [cf. **37**, 312] and intact U2 virus were equally sensitive to ultra-violet light (254 mμ). Intact U1 is protected against the damaging effects of irradiation; for this water is necessary. At wavelength 226 mμ the 2 strains were equally sensitive, U1 being 5 times as sensitive as at 254 mμ, and U2 unaltered. It is postulated that absorption of energy either by the nucleic acid or by the virus protein can lead to inactivation of U2. Absorption of energy by the nucleic acid of U1 is relatively ineffective, and absorption by the protein is mainly responsible for its inactivation.

Knight (C. A.) & Woody (B. R.). **Phosphorus content of Tobacco mosaic virus.**—*Arch. Biochem.*, **78**, 2, pp. 460–467, 1958.

From analyses at the Dept of Biochemistry, University of California, Berkeley, of

the P content of 19 samples of tobacco mosaic virus (av. 0·45%) and the P and Na content of 10 nucleic acid preparations from it (8·3 and 5·2%, respectively) it was concluded that the virus contains approx. 5·1% nucleic acid.

Loring (H. S.), Al-Rawi (S.), & Fujimoto (Y.). **The iron content of Tobacco mosaic virus and some properties of its infectious nucleic acid.** —*J. biol. Chem.*, **233**, 6, pp. 1415–1420, 2 graphs, 1958.

As a result of experiments reported from Stanford University, California, the Fe content of 2 types of purified tobacco mosaic virus preparations has been established as 0·5 mg./100 g. with a 95% confidence interval of 0·2.

Fe analyses were made on 2 samples of infectious nucleate prepared by Na dodecyl sulphate treatment and on 1 phenol-treated nucleate fraction. In contrast to the virus nucleic acid, which may contain 10–60 mg. Fe 100 g. when prepared by strong alkali, the samples treated with Na dodecyl sulphate contained only 1–2 mg. The content of the phenol-treated sample was about 8 mg.

From a study of the absorption spectra and specific infectivities of the 2 types of nucleate preparations and of fractions separated by high-speed centrifugation it was concluded that the Na dodecyl sulphate nucleate was significantly more infectious than that prepared with phenol. Nucleate fractions with divergent absorption characteristics and of variable infectivity were separated from both types of preparation by high-speed centrifugation.

Anderer (F. A.). **Das Molekulargewicht der Peptideinheit im Protein des Tabakmosaikvirus.** [The molecular weight of the peptide unit in the protein of the Tobacco mosaic virus.]—*Z. Naturf.*, **14 b**, 1, pp. 24–28, 1 fig., 1959.

At the Max-Planck-Institut für Virusforschung, Tübingen, Germany, virus protein was extracted with phenol. After precipitation with methanol the sedimentation and diffusion constants at pH 13 were computed at $S_{20} = 2$ and $D_{20} = 9·6$. From these data a mol. weight of 18,800 ±10% [**38**, 543] can be calculated, corresponding to the size of the peptide sub-unit found by the end-group determination [cf. **35**, 850 *et passim*].

Moycho (W.), Gubański (M.), & Rennert (A.). **Wyciąg z porostu Cetraria islandica inhibitorem wirusa mozaiki tytoniowej.** [An extract from the lichen *C. islandica* as an inhibitor of Tobacco mosaic virus.] —*Acta Soc. Bot. Polon.*, **28**, 1, 2 fig., 1959. [Engl. summ.]

At the University of Łódź, Poland, an extract from *C. islandica* completely inhibited the activity of tobacco mosaic virus extract [cf. **34**, 702] when mixed with it and considerably reduced its activity when diluted 1:500. When sprayed on the leaves before inoculation or within 10 min. after the extract inhibited local lesions but the inhibitory effect decreased with the increased interval between infection and application. The inhibiting factor, probably composed of lichen acids, withstood a temp. of 120° C. for 15 min., and was found in further studies in the lichens *Evernia prunastri*, *Xanthoria parietina*, *Parmelia furfuracea*, *P. physodes*, and *Ramalina* sp.

Heggestad (H. E.) & Moore (E. L.). **Occurrence of curly top on Tobacco in Maryland and North Carolina in 1958.** —*Plant Dis. Reptr.* **43**, 7, pp. 682–684, 1 fig., 1959.

The presence of beet curly top virus [map 24] was confirmed by the U.S. Dept Agric. by vector transmission studies with *Circulifer tenellus* [cf. **38**, 110]. Occurrence in the field was rare.

Yarwood (C. E.). **Tobacco necrosis virus in Cleome.**—*Plant Dis. Reptr*, **43**, 3, pp. 390–393, 1959.

Observations at the University of California, Berkeley, have shown that plant

growth may be increased as a result of tobacco necrosis virus (TNV) infection of the roots in spider plant (*Cleome spinosa*), bean, cotton, and cucumber. Inoculation was either by field soil known to be infested, by drainage water from soil on which TNV-infected *Cleome* grew, or by suspensions of macerated infected leaves poured on the soil. In 7 other hosts tested, infection by this virus produced no change in growth. Inoculation of *Cleome* leaves with TNV produced typical lesions, but *Cleome* plants with the virus in the roots contained it in the leaves also, without symptoms. Root infection was assayed on primary leaves of bean or cowpea or on cucumber cotyledons.

Azad (R. N.) & Sehgal (O. P.). **Occurrence of a virus causing distortion in Tobacco.** —*Indian J. agric. Sci.*, **28**, 3, pp. 373–380, 4 fig., 1958.

A virus occurring in a complex with tobacco mosaic virus, causing unusual symptoms in tobacco in the Simla Hills in 1953, was isolated at the Indian agric. Res. Inst., New Delhi, by passage through *Nicotiana glutinosa*. Host range was restricted to Solanaceae. It caused severe systemic infection in tobacco (vein-clearing of young leaves followed by severe mottle, green vein banding, deep green blisters, and malformation and downward curling of the leaves) and *N. glutinosa* and was transmissible to 7 other *N.* spp. but not to *N. glauca*, potato, or *Capsicum*. *Datura metel* and *Nierembergia frutescens* were symptomless carriers. The dilution end point lay between 1:180 and 1:150 and thermal inactivation point between 72 and 78° C. Its longevity *in vitro* was about 9 days. The virus has not hitherto been recorded on tobacco and the name distortion mosaic of tobacco is suggested.

Gooding (G. V.) & Lucas (G. B.). **Effect of inoculum level on the severity of Tobacco black shank.**—*Phytopathology*, **49**, 5, pp. 274–276, 1 fig., 1959.

At N. Carolina State Coll., Raleigh, 4 in. tall seedlings of 5 vars. of tobacco, grown in sand culture with nutrient solution and ranging in their reaction to *Phytophthora parasitica* var. *nicotianae* [**37**, 313] from susceptible to highly resistant, were inoculated by injection of the sand with 10 ml. of a suspension containing either 10^5, 10^4, 10^3, or 10^2 zoospores ml. The number of spores used directly affected the rapidity and severity of disease development, e.g. 10^4 spores plant killed some 50% of susceptible var. 402 in 3 weeks, but 10^5 caused 100% loss in under a week. More spores were necessary to kill resistant than susceptible vars. in a given time. Variation in succulence of the plants had a considerable influence: 2 weeks after inoculation with 10^5 spores ml. all plants of Dixie Bright 101 receiving nutrient solution daily were killed, compared with only 20% of those supplied with nutrient and plain water on alternate days. The need for standard methods of evaluating resistance to this pathogen is evident.

Gooding (G. V.) & Lucas (G. B.). **Factors influencing sporangial formation and zoospore activity in Phytophthora parasitica var. nicotianae.**—*Phytopathology*, **49**, 5, pp. 277–281, 8 graphs, 1959.

Further studies at Raleigh [see above] involved comparison of tap, distilled, and rain water, Will's solution [**34**, 823], and 0·01 M KNO_3 as incubation solutions (which were varied in depth), use of mycelium 6–20 days old, incubation 2–12 days, varied pH, 5 different isolates of the pathogen, a temp. range of 8–36° C. at 4° intervals, and continuous light or dark. Sporangia were formed consistently and abundantly when 15–20 day old aerial mycelium was stripped from oatmeal agar cultures, wetted (but not covered) with 0·01 M KNO_3, and incubated for 6–10 days at 24–26°, provided the isolate had the necessary potentiality for sporulation. Air was necessary, but not light; pH 6 was opt.

Zoospores were obtained from mats with abundant sporangia by adding 10 ml. distilled water and chilling for 25 min. at 8°; about 15 min. after return to room

temp. (about 26°) most of the sporangia had discharged zoospores. The cardinal temps. for motility and germination of zoospores were 8, 20, and 34°, with more than 90% germination between 16 and 30°. Zoospores were motile for longer and more germinated in 1% dextrose than in water or complete nutrient. At 10^6 zoospores/ml. distilled water (or 0·01 M dextrose) over 50% were motile after 4 hr., whereas at 10^3 none were motile after 5 min.; germination was about 98% at 10^5 or more/ml., but below 50% at lower concs.

POWELL (N. T.). **The nature of the black shank-root-knot disease complex in flue-cured Tobacco and its control by breeding for resistance to both pathogens.**—*Diss. Abstr.*, **19**, 11, pp. 2709–2710, 1959.

In further work at N. Carolina State Coll. on the incorporation of resistance to *Meloidogyne incognita* and *M. i. acrita* into the vars. Dixie Bright 101 and Coker 139 resistant to black shank (*Phytophthora parasitica* var. *nicotianae*) [cf. **36**, 358 and above] by a backcross procedure, the U.S. Dept Agric. breeding lines Bel 4–30 and Bel 5–56 were used as sources of nematode resistance. Black shank was much more severe in plants of the recurrent parents in the presence of both pathogens than in plants inoculated with the fungus alone. Similarly, black shank incidence was significantly higher among root-knot susceptible segregates inoculated with both pathogens than among root-knot resistant segregates under the same conditions.

Nematode entry into susceptible plants appeared to enhance fungus penetration very slightly. In hypertrophied and hyperplastic areas of galled tobacco roots mycelium was more intensive and vigorous than in non-galled areas. Hyphae progressed rapidly and directly into hyperplastic tissue and giant cells. After fungus invasion a compatible relationship apparently existed between pathogen and host in cells undergoing hyperplasia. Giant cells degenerated rapidly and within 72 hr. appeared completely devoid of protoplasm.

MORGAN (O. D.). **The use of chemical soil drenches to control Phytophthora parasitica var. nicotianae and their phytotoxic effects on Tobacco and toxicity to other soil flora.**—*Plant Dis. Reptr*, **43**, 7, pp. 755–761, 1959.

In greenhouse tests at the Univ. Md agric. Exp. Sta., College Park, 50% dusts of some omadine derivatives (disulphide, Zn, Fe, and Mn) [cf. **37**, 93] at 300 and 600 p.p.m., CC 5400 [**29**, 370] at 600 p.p.m., orthocide 406 wettable at 300 p.p.m., and N 521 [cf. **33**, 741] (90% mylone dust) at 300 and 400 p.p.m. gave good control (95–100%), compared with chloropicrin (liquid, 2 oz.) as a standard treatment [cf. **36**, 358]. Each chemical, mixed with sufficient water to drench aliquot 50 ml. quantities in a pot, was then watered in, the soil having been previously heavily infested with the pathogen [cf. above]. Six-week-old Maryland Catterton seedlings were transplanted to the treated plots. Inoculated untreated controls died in 2 weeks.

Captan was not phytotoxic when used 4 days before planting; other treatments should be applied at least 3 weeks before. The treatments lowered the fungus population and lessened competition for bacterial growth. Laboratory tests showed the fungus to be killed by 7, but not 4 days' exposure to various rates of some of the chemicals. N 521 killed the fungus at or above 80 p.p.m., the disulphide, Zn, and Mn omadine salts at or above 50 p.p.m. The Fe omadine at 200 p.p.m. and CC 5400 and orthocide 406 at 400 p.p.m. were fungistatic. All killed zoospores, apparently the weakest link in the life cycle, at low concs. N 521 seemed to be the most effective.

CRONIN (EUNICE A. T.). **The etiology of Tobacco anthracnose.**—*Diss. Abstr.*, **19**, 10, pp. 2439–2440, 1959.

At Duke University the causal fungus of tobacco anthracnose [cf. **37**, 313] was assigned to *Colletotrichum destructivum* following pathological studies and examina-

tion of its morphology in culture on a chemically defined medium. *C. nicotianae*, *C. tabacum*, and *Gloeosporium nicotianae* are stated to be synonymous with *C. destructivum*. Penetration into intact tissues was accomplished by secondary spores and appressoria, which penetrated the epidermal cells by means of infection pegs, while the adjacent cells were invaded by slender hyphal filaments from the primary mycelium. The pathological effects, which apparently preceded fungal invasion, were attributed to the diffusion of toxins from the infection site. Comparison of 4 *C. destructivum* isolates from tobacco and legumes with 15 related *C.* spp. showed the former to have similar host ranges; *C.* spp. causing anthracnose are evidently not highly specialized in their host requirements.

Rosa (M.). **Sperimentazione di alcuni prodotti per la lotta chimica contro i funghi fitopatogeni viventi nel terreno.** [Tests with certain products for the chemical control of phytopathogenic fungi living in the soil.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **16** (*1958*), 1, pp. 87–101, 1 fig., 1959. [Engl. summ.]

In 1958 tobacco seed-beds at the Stazione di Patologia Vegetale, Rome, inoculated with soil from other beds in which tobacco and tomato seedlings had been severely attacked by *Pythium* sp., *Fusarium* sp., and *Rhizoctonia* sp., were treated at intervals of 1–14 days before sowing with aqueous solutions of vapam 1%, vapam—allyl alcohol 1%, crag mylone 0·4%, bedrench (81% allyl alcohol—11·5% ethylene dibromide) 1·5%, and cryptonol 0·01%, and with aqueous suspensions of WL-1391 (composition unknown), orthocide-50, and dithex, each at 0·3%.

Thirty days after sowing no seedlings were affected by *Pythium* sp. in the vapam, crag mylone, and bedrench plots, as they were in the other plots. Infection by *Fusarium* sp. and *Rhizoctonia* sp. was greatly reduced, as compared with the other treatments, by vapam+allyl alcohol, bedrench, crag mylone, and vapam (in descending order of effectiveness), which also gave a higher proportion of seedlings suitable for transplanting. The same 4 treatments prevented the emergence of 9 spp. of weeds, which developed in the other plots.

Ribaldi (M.). **Alcune osservazioni sull' avvizzimento del Tabacco da fascia causato da Sclerotinia sclerotiorum (Lib.) De By. in colture sotto garza.** [Observations on the wilt of wrapper Tobacco caused by *S. sclerotiorum* in covered plantings.] —*Tabacco, Roma*, **63**, 690, pp. 13–24, 5 fig., 1959. [Engl. summ. 29 ref.]

A further outbreak of stalk rot and leaf wilt on Scafati 7 tobacco growing under gauze covers [cf. **38**, 227] occurred near Trestina, Perugia, in Sept. 1958. Necrotic spots appeared on the stalks, leaves, and flowers. The initial attacks generally developed on the flowers, the delicate tissues of the corolla constituting a very suitable substratum for the fungus, which probably increased in virulence thereon. Plants with infected inflorescences often bore on the leaves fragments of a rotted corolla which had clearly fallen from above. As a rule the ascospores do not attack the leaves directly, but infect the flowers: round the parts of the leaf in contact with infected flower fragments there were always dark spots, evidently produced by the initial infection. Spread of *S. sclerotiorum* is enhanced under gauze, particularly during flowering in July–Sept. The outbreak was favoured by an imbalance of mineral elements in the soil, Ca being present only in moderate amounts and K and Mg, applied with the fertilizer, in excessive quantities.

Rębowska (Mme Z.). **Wstępne badania nad wirusem mozaiki tytoniowej (TMV) na Pomidorach.** [Preliminary studies on Tobacco mosaic virus on Tomatoes.]— *Acta microbiol. polon.*, **7**, 3, pp. 245–248, 1958.

In Pracownia Fizjologii Żywienia Roślin IUNG, Puławy, Poland, tomato plants supplied with opt. Mn were more prone to infection by tobacco mosaic virus than plants deprived of Mn; infection was not affected by the source of N for the plants

(manure or Ca nitrate). Respiration was more intense in infected plants and catalase activity reduced. While the sugar (total and reducing) content of fruit and leaves was similar in healthy and infected plants, the latter had a higher vitamin C content.

Kovachevski (I.) & Markov (M.). Бронзовост по Доматите. [Bronzing of Tomatoes.] –Градинарство [*Gradinarstvo*], **1**, 6, pp. 26–29, 2 fig., 1959.

Bronzing has recently caused great damage to tomatoes in Bulgaria. In S. and SW. regions it is caused by *Lycopersicon* virus 3 [tomato spotted wilt virus: map 8], which also occurs on tobacco. A much more severe disease, also known as bronzing, responsible for 60–70% loss in Popovska and Tergovishter regions in 1958 and found only N. of the Balkan mountains, is caused by *Alternaria solani*, which infects also eggplants, sweet peppers [*Capsicum*], and tobacco. Though the southern virus type of bronzing is not known in the northern part of the country, the necrotic strain of spotted wilt has been isolated from tomatoes there. Both are transmitted by *Thrips tabaci*, very widespread, especially on tobacco and onions. Recommendations against tomato spotted wilt virus include vector control, crop rotation (planting tomatoes after tomato, tobacco, potato, onion, sweet pepper, or celery to be avoided), and ploughing deeper than 14 cm. In nurseries an application of 5 g. BHC sq. m. and the spraying of the seedlings with parathion (50 ml. 100 l. water) or volatox (100 ml.) every 7–10 days are advised.

Jones (J. P.). **Failure of thrips to transmit an isolate of Tomato spotted wilt virus.** —*Phytopathology*, **49**, 7, pp. 452–453, 1959.

At the Univ. Nebraska, Lincoln, an isolate of tomato spotted wilt virus from California and a virus causing a similar disease of tomatoes in the Lincoln area both produced similar symptoms on 6 test hosts, had similar properties *in vitro*, though the Lincoln isolate was more labile, and were transmitted between *Tropaeolum majus* plants by *Cuscuta campestris*. All attempts, however, to transmit the Lincoln virus to *T. majus* by *Thrips tabaci* [cf. **19**, 483] failed, probably because the virus titre was too low for insect acquisition, but varied results obtained by other workers in transmission of this virus by *T. tabaci* suggest unexplained aspects of their relationship.

Yen (D. E.) & Newhook (F. J.). **V-548—a new glasshouse Tomato for release in 1959.**—*N.Z.J. Agric.*, **98**, 5, pp. 487–488, 1959.

This var. was immune from leaf mould (*Cladosporium fulvum*) in all tests and more resistant to blotchy ripening [**38**, 121] than Potentate.

Schroeder (W. T.), Mack (G. L.), Brann (J. L.), & Gunkel (W. W.). **Tomato disease control in relation to gallonage and fungicide applicators.** *Plant Dis. Reptr*, **43**, 7, pp. 719–724, 1959.

Tabulated results are presented of field experiments by the N.Y. State agric. Exp. Sta., Geneva, 1951–55, in which fungicide deposition was assayed by leaf prints. For Cu prints [**37**, 211] filter paper was previously dipped in 0·1% dithiooxamide in 95% ethanol and dried. The solvent solution was 50 g. NH_4NO_3 + 150 ml. conc. NH_4OH/l. Leaves were pressed in a letter press for 30 sec. and the paper was then rinsed in running water for 30 min. and dried. For maneb prints the leaves were pressed for 1 min. between papers moistened with a solvent of 50 g. NaOH + 100 ml. 95% ethanol/l. and the print was developed for 10 sec. in 10 g. $CuSO_4.5H_2O$ + 100 ml. glacial acetic acid/l., fixed for 10 sec. in 5% aqueous $NaHCO_3$ (pH of solution maintained at 7–8), and rinsed for 30 min.

Disease conditions over the 5 yr. varied from mild to severe. Comparable control of early blight [*Alternaria solani*] and anthracnose [*Colletotrichum phomoides*: cf. **36**, 735] was obtained with 50, 100, and 200 gal./acre using a hydraulic applicator at 50

and 100 gal./acre with a commercial air blast applicator, and at 20 gal./acre using an experimental concentrate type applicator (the Cornell Row Mister III). Thus gallonage is not a determinant provided the amount of fungicide/acre is constant. These results were in correlation with the data of distribution and deposition of the fungicides as determined by leaf prints.

Strong (M. C.). **Fungicidal spray trials on Tomatoes, 1957–58.**—*Quart. Bull. Mich. agric. Exp. Sta.*, **41**, 4, pp. 853–858, 1959.

From these further trials [**29**, 439] of a range of fungicides against anthracnose [*Colletotrichum phomoides*], early blight [*Alternaria solani*: cf. above], late blight [*Phytophthora infestans*], and *Septoria* blight [*S. lycopersici*] on tomato it was concluded that a tank-mix combination of a fixed (water insoluble) Cu with ziram or zineb, each at $\frac{1}{2}$ the rate of application recommended by the manufacturers, will provide good control. Examples of such combinations are niacide Z [**38**, 17] or niacide M (48% manganous dimethyldithiocarbamate+12·4% thiram−2% manganous benzothiazylmercaptide+2·2% 2-2'-dithiobisbenzothiazole) [**37**, 554] with COCS, and tribasic $CuSO_4$ with parzate or dithane Z-78. Dyrene at 3 lb. 100 gal. and maneb are also recommended. Phaltan, tested for 2 seasons only, shows much promise. Agrimycin 500 with ziram proved very satisfactory, but has not yet been approved by the U.S. Food and Drug Admin. for application after fruit set.

Parfilova (Mme M.). Ефективність нових препаратів для боротьби з хворобами Помідорів. [The effectiveness of new preparations for the control of Tomato diseases.]—Бюл. сіл.-господ Інформ. Львівськ. Т-ва Пошир. політ. наук. Знань. [*Byul. sil-hospod. Inform. L'vivs'k. T-va Poshŷr. polit. nauk. Znan'*], *1957*, 2, pp. 49–50, 1957. [Abs. in *Referat. Zh. Biol., 1959*, 13, p. 195, 1959.]

At the L'vov agric. Inst., 1955–6, 5 dustings with Cu oxychloride (15–20 kg. ha.) gave 59% reduction of fruit infection by *Phytophthora* [*infestans*: cf. **38**, 420] and diplodiosis [*Didymella lycopersici*: map 324; **3**, 69], and 86% reduction of leaf infection by *Septoria* [*lycopersici*: **37**, 422], the corresponding reductions for standard Bordeaux mixture being 46 and 77%, while yield was raised to 72·121 centner/ha. In fruit treated with Cu oxychloride or Bordeaux mixture ascorbic acid and general acidity contents were raised. Satisfactory results were obtained with 5 applications of 2% fuclasin and 1% dinitrorhodanebenzene [cf. **36**, 635].

Ciccarone (A.). **Difesa fitopatologica nella coltura del Pomodoro.** [Phytopathological control in the cultivation of the Tomato.]—Ex *Atti 1° Conv. merid. Indus. Conserve veg., Salerno, 1958*, 8 pp., [? 1959].

Brief, practical directions are given for the control, in the conditions prevailing in the immediate vicinity of Salerno, of alternariosis (*Alternaria solani*) [cf. **37**, 248, *et passim*] and tracheomycosis (*Fusarium bulbigenum* [var.] *lycopersici* and *Verticillium alboatrum* [loc. cit.]) of tomato. The methods recommended include, for the latter disease, improved cultural methods, soil disinfection, and seed treatments (immersion for 24 hr. in acetic acid followed by dusting with dichlone), and for the former, treatment of the mature plants at intervals of a week or 10 days with zineb.

Ciccarone (A.), Casarini (B.), & Ceci (D.). **Prove di lotta in campo contro Septoria lycopersici e Xanthomonas vesicatoria.** [Field tests on the control of *S. lycopersici* and *X. vesicatoria*.]—*Industr. Conserve*, **33**, 4, pp. 320–324, 7 fig., 3 graphs, 1958.

In 1957 Marmande tomatoes in 2 fields near Parma were sprayed experimentally [cf. **37**, 249] on 6 occasions between 15 June and 29 Aug. At the 2nd count (26 Aug.) the average no. of spots/leaf in field A was 14·7 for the untreated, 0·3%

tiotox 7·11, 0·3% aspor alone 3·48, the same + glycerin for the 1st 2 treatments then 0·5% 6·57, 0·3% dithane Z-78 4, 1% Bordeaux mixture 2·88, and 0·2% M-22 2·55. In field B the corresponding figures for the untreated, 0·5% Caffaro powder, 1% Bordeaux, and copper oxide + mineral oil (0·5% cuvrol) were 18·37, 4·44, 4·08, and 2·2.

Pegg (G. F.) & Selman (I. W.). **An analysis of the growth response of young Tomato plants to infection by Verticillium albo-atrum. II. The production of growth substances.**—*Ann. appl. Biol.*, **47**, 2, pp. 222–231, 4 graphs, 1959.

In further studies at Wye Coll., Univ. London [cf. **37**, 377], potted Potentate tomato plants were grown at 65° F. with a 15 hr. daily light period at 600 foot-candles. Plants were inoculated with *V. albo-atrum* at the cotyledon stage. Samples were taken for assay from healthy and infected plants 6–8 weeks after inoculation, and were stored for not over 1½ hr. at 4° C.

The bioassays on ether-soluble acid extracts revealed the presence of substances inhibiting the growth of wheat coleoptiles in both healthy and infected leaves and stems. Assays of infected stems and leaves showed increases in growth-promoting activity expressed as indole-3-acetic acid equivalents (IAAe) of up to 200% of those of the healthy controls. Similar assays of cultures of *V. albo-atrum* showed growth-promoting activity. No acid substance able to inhibit the growth of wheat tissue could be detected in the culture filtrate. IAA was identified on chromatograms from extracts of infected stems and fungus culture filtrates. In healthy 8-leaf plants the IAAe content was greatest in the young leaves (6–8), but no gradient between leaves 1 and 5 was observed. In infected leaves increases over the controls were noted in leaves 1, 3, and 6, with a decrease in 8. In healthy stems IAAe was highest in the distal segment and they showed higher values at all 4 levels at which segments were assayed, the relative increase being greatest in the distal region.

It is concluded that the greater part of the *V. albo-atrum* syndrome, including petiolar epinasty, tylosis, pith hyperplasia, and the formation of adventitious roots, may be due to an accumulation of growth substances in infected tissue and that most of the effects on growth result from the high level of IAA-equivalent substances in the leaves and stems.

Selman (I. W.) & Buckley (W. R.). **Factors affecting the invasion of Tomato roots by Verticillium albo-atrum.** *Trans. Brit. mycol. Soc.*, **42**, 2, pp. 227–234, 2 pl. (8 fig.), 1959.

At Wye Coll., Univ. London, tomato seedlings were grown in sterile nutrient solutions containing 3 levels of sucrose, or in non-sterile John Innes compost, and examined 2 weeks after inoculation with *V. albo-atrum* [see above]. With 200 p.p.m. sucrose and in non-sterile compost or sand the fungus was confined to the piliferous layer and lignitubers projected into the outer layer of cortical cells; with 2,000 p.p.m. it reached the outer layers of the cortex and lateral root tips, where also large numbers of lignitubers were found; with 20,000 p.p.m. invasion of all the root tissues occurred, but only few and small lignitubers were present. N as nitrate at 1·58, 15·8, and 158 p.p.m. did not affect hyphal penetration or lignituber formation. Root damage induced by transplanting or deliberate scalpel cuts (more particularly the former) resulted in systemic invasion but watering a conidial suspension on to soil containing undamaged roots did not usually have such an effect.

Provvidenti (R.) & Schroeder (W. T.). **Foliage infection of Tomato and Eggplant by Verticillium.**—*Plant Dis. Reptr*, **43**, 7, pp. 821–826, 5 fig., 1959.

At N.Y. State agric. Exp. Sta., Geneva, leaf infection following spraying with a spore suspension of *V. albo-atrum* was initially marginal and chlorotic, occurring via the hydathodes; lesions subsequently enlarged and became necrotic, followed

by premature leaf fall. On resistant tomato vars. leaf symptoms were reduced in intensity, indicating that the resistant factor may not be confined to the roots as suggested by Keyworth [**32**, 399]. Leaf infection sometimes led to systemic invasion in susceptible vars. The opt. temp. for leaf infection was 70° F. (as it is for root infection). Younger plants were more susceptible.

Phillips (D. H.). **The destruction of Didymella lycopersici Kleb. in Tomato haulm composts.**—*Ann. appl. Biol.*, **47**, 2, pp. 240–253, 1959.

In further studies at the States' Experimental Station, Jersey, on tomato stem rot (*D. lycopersici*) [cf. **38**, 238], the results of laboratory trials with agar cultures and with infected tomato stems and fruits indicated that the fungus is destroyed if kept in moist conditions at 35° C. for 3–6 days. Agar cultures buried for this length of time in composting material at this or a higher temp. were dead when recovered. When composts made from haulms of tomato plants affected by *D. lycopersici* were placed round the stem bases of tomato plants, or when tomato plants were grown in them, few of the test plants developed infection, but when tomato plants were treated with uncomposted haulm even 6 months old heavy losses were sustained [cf. **36**, 138]. It is concluded that *D. lycopersici* in tomato refuse can be destroyed in well-made compost, turned and remixed several times during treatment.

Dimond (A. E.). **Pathogenesis in the Fusarium wilt diseases.**—*Trans. N.Y. Acad. Sci.*, Ser. II, **21**, 7, pp. 609–612, 1959. [13 ref.]

The characteristic syndrome of the *F.* wilts, as exemplified by *F. oxysporum* f. [*F. bulbigenum* var.] *lycopersici* on tomato, is described under the headings of the epinastic phase, wilting of leaves, vascular browning, and shrivelling of leaves. The operation of the several distinct biochemical mechanisms involved in the production of these effects is explained. The tomato wilt symptoms are regarded as typical of *F.* wilts in general.

Rankin (H. W.) & Good (J. M.). **Effect of soil fumigation on the prevalence of southern blight on Tomatoes.**—*Plant Dis. Reptr*, **43**, 4, pp. 444–445, 1959.

Trials by the Georgia Coastal Plain Experiment Station and the U.S. Dept Agric., Tifton, Georgia, with D-D and nemagon in connexion with the possible association of nematodes with attack on tomatoes by *Sclerotium rolfsii* [cf. **37**, 681], showed that D-D at 10 gal./acre in the row (though reducing the root knot index from 0·8 in the control to 0·36) gave an average of 22·4 dead plants and nemagon at 3½ qt./acre, 14·2, compared with 12·2 in the control, indicating an increase of the incidence of southern blight. It would appear that under certain conditions D-D, and probably other soil fumigants, affect the biological content of the soil so that an increase or decrease of certain organisms, sometimes pathogenic, results [cf. **38**, 114].

Crozier (J. A.) & Boothroyd (C. W.). **Tomato a new suscept of Gibberella zeae (Schw.) Petch.**—*Plant Dis. Reptr*, **43**, 4, pp. 446–447, 3 fig., 1959.

In a glasshouse at Ithaca, New York, in 1957, ripe Marglobe tomatoes were found to be partly rotted, the flesh in the fruit showing a deep purplish red colour. Isolation yielded a fungus resembling *G. zeae* which produced a rapid rot on inoculation of both green and red tomato fruits. The affected tomatoes showed a high proportion of shoulder cracking and it is believed that the rot was caused by spores of *G. zeae* from the wheat straw used as mulch.

Ferrer (J. B.) & Owen (J. H.). **Botrytis cinerea the cause of ghost-spot disease of Tomato.**—*Phytopathology*, **49**, 7, pp. 411–417, 2 fig., 1959.

At the Coll. Agric., Univ. Fla, Gainesville, ghost spot symptoms [**35**, 50], which occur on tomato fruits, chiefly on the upper halves of immature fruit, in

Florida mainly in March–May, when heavy dew or night rain precedes a sunny morning, could not be reproduced in the greenhouse by mechanical injury, the effect of water droplets and sunshine [**16**, 421], of high and low temp., ultraviolet rays, or concentrated sunlight. Inoculation of immature fruit, however, with a suspension of *Botrytis cinerea* [cf. **16**, 728], with subsequent incubation for 8–12 hr. at 16–24° C. in a humid atmosphere, resulted in the formation of necrotic spots similar to those in the centre of ghost spots. If kept under these conditions *Botrytis* grey mould rot appeared; if left 6–24 hr. at 33–35° C. a solid white disk often developed around the necrotic spot and at 38–40° ghost spot symptoms appeared. Fruit 1·5–3 cm. diam. when inoculated became heavily spotted, smaller fruit had fewer spots but developed necrotic areas and larger fruit developed few or no ghost spots.

The 6 tomato vars. tested showed no difference in susceptibility. Symptoms were not produced either by pectinase, sprayed onto fruit after wounding, nor by a filtrate of *B. cinerea* spores. Histological studies showed the halo round the necrotic spot to result from air spaces between the epidermis and the collenchyma [cf. **17**, 633]. Staining of tissue at the necrotic specks revealed appressorium-like structures, indicating penetration by the fungus, increase in thickness of the epidermal cell wall, and penetration of the glandular trichomes of the fruit.

Hayslip (N. C.) & Stall (R. E.). **Severity of Tomato soil-rot caused by Rhizoctonia solani as influenced by former pasture crops.**—*Plant Dis. Reptr*, **43**, 7, pp. 818–820, 1 fig., 1959.

In a series of experiments during 1950–58 at the Indian River Field Lab., Fort Pierce, Fla., tomato crops, initially planted on virgin soil, were subsequently rotated with pasture crops. The incidence of fruit rot induced by *R.* [*Corticium*] *solani* [cf. **36**, 215] was markedly higher (in one case 25·2%) when white Dutch clover was included with Pensacola Bahia grass [*Paspalum notatum*] and pangola grass [*Digitaria decumbens*] in the preceding crop than when the grasses alone were used.

Stall (R. E.). **An evaluation of spray materials for control of bacterial spot on field seeded Tomatoes.** –*Plant Dis. Reptr*, **43**, 7, pp. 725–728, 1959.

Trials at the Everglades Exp. Sta., Fort Pierce, Fla., showed that under relatively mild conditions of infection good control of *Xanthomonas vesicatoria* was obtained with Cu materials (tribasic copper sulphate) alone, though the addition of streptomycin [**37**, 314] gave slightly better results. Some other materials tested were less effective or ineffective.

Khramtsov (N. N.). Борьба с вредителями и болезнями лесных насаждений в СССР. [Control of pests and diseases in forests in U.S.S.R.] IX International Conference on Quarantine and Plant Protection from Pests and Diseases. Report of the Soviet Delegation. 12 pp., Moscow, Min. Agric., U.S.S.R., 1958.

This report, delivered in Moscow, Aug. 1958, deals with methods for detecting widespread forest diseases, one of which is from aircraft, and is generally used in Siberia and the far Eastern parts of U.S.S.R. An extensive review of control measures is followed by an account of the prophylactic measures. Needle fall of pines (*Lophodermium pinastri*) [**36**, 559], a similar disease of larch (*Hartigiella* [*Meria*] *laricis*), and mildew of oak and other trees (*Microsphaera alphitoides*) [**38**, 341], are considered the most damaging and against them dusting and spraying have had a very good effect. A description is also given of the co-ordination in the work of plant protection between different institutions.

Lohwag (K.). **Ein Beitrag zur Pilzflora der Türkei.** [A contribution to the mycoflora of Turkey.]—*Rev. Fac. Sci. for. Univ. Istanbul*, Ser. A, **7**, 1, pp. 118–137, 3 fig., 1957. [Turkish translation.]

A list is presented of forest fungi found during excursions in N.W. Turkey during summer 1957 [cf. **38**, 396]. The spp. include *Stereum purpureum* [map 30], constantly found on stored timber of deciduous trees, especially destructive to poplar, and *Fomes annosus* [map 271], common on the roots and trunk bases of conifers.

Orłoś (H.) & Brennejzen (B.). **Badania nad zwalczaniem hub drzewnych za pomocą zastrzyków środków grzybobójczych.** [Investigations into methods of controlling decay by injecting fungicides into standing trees.]—*Roczn. Nauk. leśn.* 19, pp. 3–42, 1957. [Russ., Engl. summ. 40 ref. *For. Abstr.*, **20**, 1, p. 91, 1959.]

Of several fungicides tested for injection into standing trees via a Pressler borer and hose attachment (the hole being plugged with a wooden stopper and smeared with a paste) $ZnCl_2$, NaF, and $CuSO_4$ proved the best. Pine trees attacked by *Trametes* [*Fomes*] *pini* and *F. annosus* and aspens attacked by *F. igniarius* were treated. Injection killed the mycelium without damaging the tree, but was ineffective with *F. annosus*. Cutting off fruiting bodies and smearing the wound with fungicidal paste was less effective, and painting the lower surface of the sporophores with oil no use.

Orłoś (H.). **Badania nad zwalczaniem opi eńki miodowej (Armillaria mellea Vahl) metodą biologiczną.** [Investigations on the biological control of *A. mellea*.] *Roczn. Nauk. leśn.* 15, pp. 195–236, 1957. [Russ., Engl. summ. 50 ref. *For. Abstr.*, **19**, 4, p. 551, 1958.]

In 1953–55 studies were made at the Forest Res. Inst., Warsaw, on the use of fungi not injurious to living trees to counteract *A. mellea* in stumps left after removal of infected trees. In laboratory tests *Polyporus borealis* and *Fomes marginatus* were grown on culture media and spruce blocks inoculated simultaneously or earlier with *A. mellea*. *F. marginatus* proved the best and was to be tried in the field on stumps barked and with surrounding rhizomorphs cut. *Trametes odorata*, *Polyporus fibrillosus*, and *Coniophora cerebella* [*C. puteana*] are other possibilities.

Koch (J.). **Svampe i planteskolen.** [Fungi in the nursery.] –*Dansk Skovforen. Tidsskr.*, **44**, pp. 220–231, 2 fig., 1959.

Information is summarized on the effects of the following pathogens prevalent in Denmark [**18**, 717] and control by cultural methods and chemical treatments: species of *Pythium*, *Phytophthora*, and *Fusarium* and *Rhizoctonia* [*Corticium*] *solani*, causing damping-off of deciduous trees and conifers; *P. cactorum*, attacking beech cotyledons; oak mildew (*Microsphaera alphitoides*); *Crypodiaporthe* (*Dothichiza*) *populea*, considered to be the most formidable parasite of poplars; *Lophodermium pinastri* on pines; *Didymascella thujina* on *Thuja plicata*; *Meria laricis* on larch; *Melampsoridium betulinum* on birch (*Betula pubescens* and *B. verrucosa*); and *Thelephora terrestris*, the fruit bodies of which overgrow and strangle both hard- and softwood seedlings [cf. **36**, 730].

Chevaugeon (J.). **Le problème des pourridiés en Côte d'Ivoire.** [The problem of root rots in the Ivory Coast.]—*Rev. Mycol., Paris*, **24**, 1, pp. 39–58, 1 pl., 1 diag., 1959. [19 ref.]

The author (working in collaboration with L. A. Assi and S. D. Keuli) presents a list of the chief agents of root rot of numerous crop plants and shade trees in humid tropical areas and gives a full account of the root rot of coffee, cacao, and rubber caused by *Fomes lignosus* [cf. **33**, 757 *et passim*] in the French Ivory Coast. Included are symptoms, the biology of the fungus, the importance of the rotting

of forest trees (listed) by the same fungus, and methods of control (1) at clearing, (2) between clearing and planting, (3) at planting, and (4) during cultivation. The standard Belgian or Yangambi treatment [**35**, 925], a combination of surgical and chemical methods with exposure of the roots to the air, based on Napper's technique [**12**, 54; **17**, 62] should be tried in the Ivory Coast as soon as possible.

GILL (D. L.). **Wilt-resistant Mimosa trees.**—*Nat. hort. Mag.*, **38**, 2, pp. 105–107, 3 fig., 1959.

At Tifton, Georgia, seedlings of *Albizzia julibrissin*, inoculated by dipping the roots in a spore suspension of *Fusarium oxysporum* f. *perniciosum* [**37**, 664] and surviving the 1st test, were inoculated repeatedly thus or by adding the fungus in the soil. Seeds from resistant trees produced only a small percentage of resistant seedlings; thus it is necessary to propagate vegetatively, preferably by root cuttings.

From selections of wilt resistant seedlings, grown in a number of naturally infested locations, 2 clones were selected: Tryon with deep pink flowers and Charlotte (light pink), which are now being offered to the trade. *Meloidogyne javanica* and *M. incognita*, root-knot nematodes, increased the number of wilting seedlings, but they were not necessary for infection.

BAKSHI (B. K.) & SINGH (S.). **Root diseases of Shisham (Dalbergia sissoo Roxb.) VIII. Inoculation studies on wilt.**— *Indian For.*, **85**, 7, pp. 415–421, 2 pl. (1 col.), 1959.

Further studies at the Forest Res. Inst., Dehra Dun, confirm that *Fusarium solani* f. *dalbergiae* [cf. **37**, 117; **38**, 629] causes wilt of *D. sissoo*. Seeds sown in inoculated sand-oats medium or on fungal mats subsequently covered with sand were either blighted at an early stage or survived stunted. Seedlings 6–12 months old, with roots intact or clipped at the tips, wilted after exposure to a mycelium-spore suspension.

Filtrates from a 2-week culture on Richards's medium produced wilting in similar [? intact] seedlings, crude filtrates being more potent than dialyzed. All the plants wilted in 2–5 days, and in most the leaflets turned brown and their margins rolled inwards in 20–30 hr., after which they dried up, and the petiole and main shoot drooped. In 1 group, however, exposed to a sintered glass filtrate, the symptoms were as seen in natural infections, the lower leaves, and then all leaves, becoming pale and yellow, while the margins or the tips of some rolled inwards. The petioles subsequently became flaccid and the plants died.

Healthy 25-yr.-old trees were inoculated in the stem or root, using plugs which had been removed with a Pressler borer, autoclaved, and thoroughly infected by exposure for 1 month to an active culture. These plugs and sometimes also the malt agar inoculum were pressed home and covered with sterile cotton, which was maintained moist for a week before final sealing with cotton cloth soaked in molten sealing wax. With stem inoculation 8–10 plugs were used, encircling the stem in a spiral.

Of 3 trees inoculated in the roots 1 wilted in 6 months, and of 17 inoculated in the stem 10 wilted in 14 months. Symptoms were typical of those in naturally wilted trees. Where the inoculations had proved successful there was pink staining of the sapwood, spreading 10–16 in. with the grain, and the fungus could be reisolated, but where the inoculation was unsuccessful there was a deep red stain 2–3 cm. above and below the hole, representing a wound reaction, and the fungus could not be reisolated.

ŽUKLYS (L.). **Guobinių maras Lietuvoje ir kovos būdai su juo.** [Dutch Elm disease in the Lithuanian S.S.R. and control measures.]—*Darb. Liet. miš. ūk. moks. tyr. Inst., Kaunas*, **3**, pp. 155–185, 8 fig., 1 map, 1958. [Russ. summ. 31 ref.]

From the Lithuanian Forestry Research Institute, Kaunas, it is reported that elms, especially in central Lithuania, in the post-war period have become severely

infected by *Ceratostomella* [*Ceratocystis*] *ulmi* [map 36; cf. **36**, 561]. Infection is widespread, occurring on river banks, in parks, in urban plantations etc., where elms are frequently encountered. Severity depends on the time of infection and where the focus of infection is situated in the tree, the highest intensity developing in trees infected in June–July. The most influential role in dissemination is played by the bark beetles [cf. **37**, 683] *Scolytus scolytus* and *S. multistriatus*; *S. pygmaeus* is of lesser account. Otherwise, to a lesser extent, infection may be induced through the root system and underground part of the tree, without the participation of bark beetles.

Kireev-Varshavskiĭ (E. P.). Ещё раз в борьбе с голландской болезнью Ильмовых. [A return to the question of Dutch Elm disease control.]—Лесн. Хоз. [*Lesn. Khoz.*], *1958*, 12, pp. 43–44, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 13, p. 192, 1959.]

Existing control measures are inadequate for dealing with the progressive massive dissemination of the disease (*Graphium* [*Ceratocystis*] *ulmi*) [**36**, 561] in the Stavropol area, U.S.S.R. Recommendations are made for the purpose of finding new control measures: observation of elm plantations in zones with different growth conditions, verification of the bioelectric potential of diseased and healthy trees, which makes possible diagnosis of infection without external symptoms, and also verification of whether the development of *C. ulmi* is due to heat of some kind received by the tree during the year.

Santamour (F. S.) & French (D. W.). **Toxin in relation to resistance to Dutch Elm disease.**—*Minn. For. Note* 65, 2 pp., 1958. [*For. Abstr.*, **19**, 4, p. 553, 1958.]

In a Petri dish experiment with 5 newly germinated seeds each of *Ulmus americana* and *U. pumila* 5 ml. of toxin filtrate, produced in shake culture of *Ceratocystis ulmi*, stimulated root growth of the resistant *U. pumila* but had a variable effect on *U. americana*. Toxin from stationary culture killed both spp. in 12 hr. The relative increase in root growth is considered worth further investigation as a possible means of distinguishing susceptible and resistant elms.

Magnani (G.). **Una alternariosi fogliare di piantine di Eucalitto.** [An *Alternaria* leaf-spot of Eucalyptus seedlings.]—*Monti e Boschi*, **9**, 4, pp. 181–187, 1958. [Fr., Engl. summ. *For. Abstr.*, **19**, 4, p. 555, 1958.]

Lesions on potted plants of 11 *Eucalyptus* spp. in nurseries in southern central Italy began as red spots < 1 mm. diam.; later a red halo surrounded a brown necrotic area. *A.* aff. *tenuissima* is regarded as the causal organism. On re-inoculation of 248 leaves of 8 spp. 6·1% developed typical lesions and 21·3% atypical (necrotic area only).

Fergus (C. L.) & Wharton (D. C.). **Oak wilt : histological studies of host reaction and pathogen.**—*Progr. Rep. Pa agric. Exp. Sta.* 168, 6 pp., 1957. [*For. Abstr.*, **19**, 4, p. 553, 1958.]

When samples were collected from *Quercus rubra* at intervals after inoculation with the oak wilt fungus [*Ceratocystis fagacearum*: **38**, 629] mycelium was found in the sapwood of the bole and in a few roots, but not in twigs or petioles over a period of 8 months. A detailed account of the histology is given; tyloses occurred in the vessels of all organs, but fewer in the roots than the twigs. No spores were found in over 300 sections.

Ohman (J. H.), Anderson (N. A.), & French (D. W.). **Comparison of dry and chemical girdling to prevent sporulation of the Oak wilt fungus.**—*J. For.*, **57**, 7, pp. 503–506, 3 fig., 1 graph, 1959.

In Minnesota the chemical girdle with sodium arsenite proved to be the most effec-

tive means to control sporulation of *Ceratocystis fagacearum* [cf. **37**, 118 *et passim*]. Mats are reduced in both size and number and production is eliminated in spring when disease transmission is most prevalent. Either a proprietary compound (Atlas 'A') containing some 40% sodium arsenite was mixed 1:1 with 10% aqueous sodium pentachlorophenate, or 8 lb. dry As_2O_3 and 2 lb. dry NaOH were mixed in 3 qt. water. The test trees (av. 8 in. d.b.h.) were inoculated, then girdled when 10% of the crown showed incipient wilt (usually about 5 weeks later). The treatment is best when applied to trees wilting early in summer. Dry girdling and other chemical treatments were less effective.

Barnett (H. L.). **Special mechanisms for exposing fruit bodies of some wood-inhabiting fungi.**—Abs. in *Proc. W. Va Acad. Sci.*, **29** (*1957*), p. 33, 1959.

Endoconidiophora [*Ceratocystis*] *fagacearum* [cf. above] develops a pressure cushion near the centre of the mycelial mat, which raises and cracks the bark and so permits the entry of insects. *Hypoxylon punctulatum* [see below] develops at the edge of its stroma a ridge of gelatinous tissue which expands and throws off the bark covering: the conidial state forms cave-like areas in the bark by means of small 'pillars'. *Poria obliqua* develops its fruit bodies in dead wood at a depth of 1 or 2 annual rings, and sharp marginal ridges of tissue are used to force off the bark and the outer wood.

Shigo (A. L.). **The growth in mixed cultures of some fungi associated with Oak wilt.**—Abs. in *Proc. W. Va Acad. Sci.*, **29** (*1957*), p. 24, 1959.

The number of genera represented by fungal isolates made between June 1956 [**38**, 340] and the time of writing [see below] from 175 oak trees affected by *Ceratocystis fagacearum* [**37**, 118] totals more than 65. *Dothiorella quercina*, *Trichoderma lignorum* [*T. viride*], *Gliocladium roseum*, *Cephalothecium* [*Trichothecium*] *roseum*, *Hypoxylon atropunctatum*, and *Penicillium stricta*, chosen because of the frequency with which they were isolated, all adversely affected the growth of the oak fungus. *D. quercina*, the fungus most frequently isolated from wilted trees, inhibited the growth of most of the fungi studied.

Shigo (A. L.). **Inoculation experiments on Oak wilt trees in 1957.**—Abs. in *Proc. W. Va Acad. Sci.*, **30** (*1958*), p. 145, 1959.

Gliocladium roseum, known to inhibit the growth *in vitro* of *Ceratocystis fagacearum* [see above] was inoculated into oak trees previously inoculated with the wilt fungus. It did not destroy the wilt fungus, apparently because it did not spread through the trees.

Gorlenko (M. V.). О приоритете Г. С. Неводовского в описании нового вида мучнисторосяного гриба на дубе. [On the priority of G. S. Nevodovskiĭ in the description of a new species of powdery mildew fungus on Oak.] *Bot. Mater.* (*Notul. syst. Sect. crypt. Inst. bot. Acad. Sci. U.S.S.R.*), **12**, pp. 157–159, 1959.

The author considers *Microsphaera hypophylla* Nevodovskiĭ (1952, *Fungi of U.S.S.R.*, **1**, 4) and *M. silvatica* Vlasov, 1954 [**37**, 318] to be identical [cf. also **31**, 578]. Both differ from *M. alphitoides* in having little oidial development which is purely hypophyllous.

Igmándy (Z.). **A fehér csetapló (Leptoporus irpex (Schulz)) előfordulása és károsítása hazánkban.** [Occurrence of and damage caused by *L. irpex* in Hungary.] —*Erdőmérn. Főisk. Közl.*, *1957*, 1, pp. 67–73, 1957. [Russ., Fr. summ. 15 ref. *For. Abstr.*, **19**, 4, p. 552, 1958.]

L. [*Polyporus*] *irpex*, rare elsewhere in Europe, causes considerable damage to *Quercus cerris* in Hungary [**37**, 187], especially to coppice. *Q. sessiliflora*, *Q. languinosa*, and beech are other hosts. The taxonomy of the sp. is discussed.

Dzhafarov (S. A.). Новый паразитный гриб на каштанолистном Дубе. [A new parasitic fungus on the chestnut-leaved Oak.]—Лесн. Хоз. [*Lesn. Khoz.*], **11**, 7, pp. 42–43, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 10, p. 212, 1959.]

Ganoderma resinaceum f. *quercinum* Dzhafarov [cf. **31**, 509; **37**, 157], first found in the forests of Taluish, Azerbaijan, causes a white heart rot of chestnut-leaved oak [*Quercus castaniifolia*]. The fungus constitutes a serious danger by reason of its long spore-producing period (May–Dec.). All trees 250 yr. and over appear to be infected.

Aerts (R.), Soenen (A.), & Beauduin (E.). **Essais de lutte contre le Dothichiza du Peuplier (Dothichiza populea Sacc. et Br.).** [Control of *Dothichiza* of Poplar.]—*Agricultura, Louvain*, Sér. 2, **7**, 2, pp. 269–287, 2 fig., 1959. [Flemish, Engl., Germ. summ. 21 ref.]

Very promising results are reported from the Centre de Recherches, Gorsem, Belgium, of 5 tests in nursery control of *D. populea* [**36**, 217] by spraying 1–2-year-old trees during the growing seasons of 1956–58 (up to 8 treatments were given) with a 0·1% mixture of carbamates and urbacide, 0·5% Cu oxychloride, or 0·2% chlorodinitronaphthalene. The critical period for infection extends from bud-burst throughout spring and part of the summer. Disinfection of cuttings does not confer adequate protection since they may be attacked in the nursery. External symptoms do not develop for a long time, sometimes only after transplanting. Autumn and winter infections were never responsible for damage to transplants under the conditions of these experiments.

Mikalaikevičius (V.). **Kai kurie drebulinės pinties (Phellinus tremulae Bond. e Boriss.) biologijos klausimai.** [Some questions of the biology of the polypore, *Fomes tremulae*.]—*Darb. Liet. miš. ūk. moks. tyr. Inst., Kaunas.* **3**, pp. 187–203, 1 fig., 1958. [Russ. summ.]

Sporulation by *F. tremulae* [cf. **36**, 671] was determined at the Lithuanian Forestry Research Institute, Kaunas, to start in the spring (29 Apr. 1955; 17 Apr. 1956) and to continue with some interruptions until late autumn (mid-Oct. 1955 and at the end, 1956). Interruptions usually occur in noticeably cool or protracted dry periods, rain being a very important factor, as desiccation of the hymenial layer with concomitant cessation of sporulation is connected with significant losses of humidity by the fruit body. By protecting it from rain by fixing a small roof to the aspen tree above it, the gradual desiccation of the hymenial layer could be observed. Such fruit bodies hardly ever developed a hymenial layer, but where it did develop, in especially rainy weather, it was either thinner than normal, or present only on some parts of the surface of the old hymenial layer. Spores of *F. tremulae* grew well in a drop of water under a cover glass in the presence of a section of aspen wood tissue. It was not possible to obtain a culture of *F. tremulae* from reddened wood of young aspens.

Day (M. W.) & Strong (F. C.). **A study of Hypoxylon canker on Aspen.**—*Quart. Bull. Mich. agric. Exp. Sta.*, **41**, 4, pp. 870–877, 8 graphs, 1959.

In this study at the Dunbar Forest Exp. Sta., Sault Ste. Marie, Mich., the progress of canker (*Hypoxylon pruinatum*) [**38**, 39] was followed in individual sample trees of *Populus tremuloides*, which were examined over an 8 yr. period at intervals of 1 yr. or less. In each age group disease incidence was greater in less dense stands. Growth rates of all cankers and of individual cankers at different seasons varied considerably; greatest growth occurred in cool, dry weather. The height of cankers was related to d.b.h., and was higher on the bole in larger trees. Infected trees usually died within 3 yr. of the cankers appearing, though there were some recoveries when they were in the upper part of the crown. Attempts to induce cankers

artificially on young trees with lesion bark as inoculum were unsuccessful [cf. **24**, 255].

Van der Meiden (H. A.) & Van Vloten (H.). **Roest en schorsbrand als bedreiging van de teelt van Populier.** [Rust and bark necrosis as threats to Poplar growing.]—*Ned. Bosb. Tidschr.*, **30**, 9, pp. 261–273; 10, p. 289, 1958. [Engl., Ger. summ. *For. Abstr.*, **20**, 2, p. 254, 1959.]

Following extensive planting of Japanese larch [*Larix leptolepis*] in N. Brabant, Netherlands, *Populus* × *marilandica* has suffered marked reduction in diam. growth and *P.* × *serotina* and *P.* 'Heidemij cv.' (*P. deltoides* var. *missouriensis*) more serious damage from heavy attacks of *Melampsora larici-populina* [**34**, 685], which in turn renders them more susceptible to *Dothichiza populea* [**38**, 341]. *P.* × *gelrica* and some other clones less susceptible to rust and suffering less growth reduction should be used to replace susceptible vars. and 1-yr.-cuttings, seldom infected by *D. populea*, should be used to establish plantations. Nurseries must be regularly sprayed against rust and close planting and heavy N application, which cause rapid and prolonged growth, avoided.

Opsal (P. M.) & Hossfeld (R. L.). **The nature and significance of the natural durability of diamond Willow heartwood.**—*For. Prod. J.*, **9**, 6, pp. 188–192, 6 fig., 2 diag., 1 graph, 1959.

At the Sch. Forestry, Univ. Minn., St. Paul, $\frac{3}{4}$ in. cubes of outer heartwood of *Salix eriocephala* and *S. discolor*, both with diamond-shaped stem cankers associated with durability, and sapwood cubes of *Populus tremuloides* were conditioned for 24 hr. at 70° C. and weighed. 'French' 8 oz. bottles half filled with loam soil (moisture content 40%) and having horizontal aspen feeder strips, were sterilized and inoculated with *Polyporus tulipiferus*, *P.* [*Polystictus*] *versicolor*, or an unidentified isolate from decayed 'diamond willow'; 11 days later surface cleaned blocks were placed on the mycelium-covered strips and the bottles were incubated at 23–30° and R.H. 70–83% for 90 days. The blocks were then brushed clean, reconditioned, and weighed. The percentage weight losses were: *S. eriocephala* 17, *S. discolor* 30·7, and aspen 50·3, and the relative durability of the 2 willows (expressed as a ratio to that of aspen) was 1·67 and 1·39, respectively.

Air-dried, ground heartwood (300 g.) of *S. eriocephala* was extracted with 2 successive 3 l. portions of distilled water at 70–80°, and the residue washed, air-dried, and extracted again with 95% ethyl alcohol. The components of each extract were partitioned chromatographically. A phenolic compound corresponding to component 7 on the chromatogram and amounting to 30% of the crude extract was shown to be toxic to *Polyporus tulipiferus*; it occurred in heartwood but not in the sapwood and appeared to be the major toxic constituent of the extracts.

Tree disease investigations.—*Rep. For. Exp. Sta. Hokkaido 1957*, pp. 9–10, 1959. [Japanese.]

A disease of *Abies sachalinensis*, caused by *Agrocybe tuberosa*, first observed in May 1957 in sapling plantations at the Obihiro district Forestry Office and subsequently in 15 plantations, develops its characteristic symptoms in the autumn seed beds. Sclerotia of different sizes are formed in great numbers in the soil of infected beds. Seeds under snow are attacked.

The pathogenicity of the causal fungus of withering of young shoots of *Abies sachalinensis* was confirmed and the fungus was isolated repeatedly from bud tissues of the infected shoot [but not named].

Isolations from leaf-fall specimens of European larch received about June, when the fungus attains its perfect state, gave for the most part *Mycosphaerella laricileptolepis* [**38**, 343]. In addition, *Lophodermium*, *Discosia*, and several undetermined fungi were obtained.

Crown wilt of European larch was conspicuous and frequent, especially in the afforestation areas of the Sapporo Regional Forestry Office and the Takigawa Forestry Station. Damage in sapling plantations was especially striking, and it was thought that it might spread to the seed beds. The *Sphaeropsis* form of the fungus [cf. **12**, 790] was thought to occur about June–July.

Trione (E. J.). **The pathology of Phytophthora lateralis on native Chamaecyparis lawsoniana.**—*Phytopathology*, **49**, 5, pp. 306–310, 2 fig., 1959.

This information has already been noticed [**38**, 231].

Hopp (P. J.). **Zur Kenntnis des Lärchenkrebses (Dasycypha willkommii) an Larix decidua.** [On the knowledge of Larch canker (*Trichoscyphella willkommii*) on *L. decidua*.]—*Forstwiss. Zbl.*, **76**, 11–12, pp. 334–354, 1957. [44 ref. *For. Abstr.*, **20**, 2, p. 253, 1959.]

Study of severely damaged trees and some young cankered larch plantations [in Germany: cf. **32**, 406; **38**, 715] showed most cankers to begin on 2–5-yr.-old shoots, regardless of the age of the tree, and stem cankers to be generally on the green leading shoot and rarely from branch cankers extending to the stem. The larger the crown, as in dominant trees, the more the lesions, and damage was greater in dense than in more open stands. Thinning cannot prevent canker, but may improve resistance. In larch-spruce stands of like age a higher percentage of spruce appears to increase damage on larch. Presence of *Ernarimonia zebeana* was not correlated with the occurrence of canker.

Vsevolozhskaya (Mme G. K.). Влияние предпосевной обработки семян на энергию прорастания и стойкость сеянцев Сосны обыкновенной (**Pinus silvestris L.**) к грибным заболеваниям. [The effect of pre-sowing seed treatment on germination vigour and resistance of seedlings of common Pine (*P. sylvestris*) to fungus diseases.]—Науч. Докл. высш. Школ. [*Nauch. Dokl. vÿssh. Shkol.*], Ser. biol. Sci., *1959*, 1, pp. 98–102, 1959.

In experiments begun in 1953 the use of solutions of micro-elements for treating pine seeds before sowing was found to be a highly effective method for raising resistance to fungus diseases, including shoot wilting caused by *Fusarium* spp. and yellowing and shedding of the needles caused by *Lophodermium pinastri*, and improving tree quality. Hardening by periodic (triple) steeping in solutions of different salts and drying is the most promising method, especially effective being 0·01% $ZnSO_4$ and $CuSO_4$. Pre-sowing hardening in tap water has a much better effect on germination vigour, shoot resistance to diseases, and subsequent growth than [? distilled] water steeping for a similar period. Treatment in a 0·02% urea for 48 hr. also had a positive effect.

Lightle (P. C.). **Cone rust on Slash Pine controlled by ferbam.**—Abs. in *Phytopathology*, **49**, 5, p. 318, 1959.

Ferbam (2 lb./100 gal.) was applied to slash pine [*Pinus elliottii*] flowers at 4 stages to control *Cronartium strobilinum* [**36**, 625]; (1) strobilus tip just discernible, (2) exposed but scales not open, (3) scales flat open, receptive to pollen, (4) scales closed. At 10 weeks after treatment infection was reduced from 70% in the controls to 53, 39, 12, and 7·5%, respectively. To cover varying times of flower maturation at least 2 sprays would be needed in practice. A count of subsequent seed viability is needed to check the apparent non-phytotoxicity of this spray.

Wagener (W. W.). **The effect of a western needle fungus (Hypodermella medusa Dearn.) on Pines and its significance in forest management.**—*J. For.*, **57**, 8, pp. 561–564, 1 fig., 1959.

The greenish-white fading of pine foliage, darkening subsequently to brown, which

occurs in parts of the western United States in spring or early summer, is attributable to *H. medusa* [cf. **37**, 121], which is fairly widely distributed in Ponderosa pine forests E. of the Cascades in Wash., Oregon, and N. Calif., but prevalent only in limited areas, and even there affects $< 10\%$ of the trees. It has been recorded on *Pinus jeffreyi*, *P. ponderosa*, and *P. contorta*. Severity of infection, which occurs chiefly on poor sites, varies greatly from tree to tree; susceptibility appears to be inherited and to remain constant. The hysterothecia of the fungus appear in spring, generally on foliage over 2 yr. old, and more often near the base of the needles. Spore discharge is in summer and autumn. Drought, especially in autumn, increases incidence. The disease is of little economic importance.

Rishbeth (J.). **Dispersal of Fomes annosus Fr. and Peniophora gigantea (Fr.) Massee.** — *Trans. Brit. mycol. Soc.*, **42**, 2, pp. 243–260, 1 map, 1959.

Deposits of 20 spores 100 sq. cm. hr. were obtained on freshly cut sections of pine stem [**36**, 505; **38**, 713] exposed in forests in relatively calm conditions and close to sporophores (the max. recorded was 280 spores), while rates of 1–5 spores/hr. were obtained in well ventilated plantations with local spore sources [**37**, 605]. This technique gives an estimate of viable spores, 1–5% for *F. annosus* and over 50% for *P. gigantea*. The latter, which fruits on fallen branches as well as stumps, was rather more evenly distributed than *F. annosus*, mostly confined to stumps. Apart from temporary weather effects, discharge of *P. gigantea* remains fairly constant throughout the year, though in E. Anglia that of *F. annosus* declines in mid- to late-summer. *F. annosus* was trapped in 59% of 140 static exposures [loc. cit.] from July 1957 to Aug. 1958 and *P. gigantea* in 81%. The determinations were carried out in winds of varied directions and the rates of deposition of the 2 spp. exceeded 20 spores 100 sq. cm. hr. near to forests, but though these declined with distance from source, both fungi were detected in the Shetland Islands, some 200 miles from source, and also other forest spp.

The deposits of *F. annosus* spores on samples of spruce and pine foliage from some British forests varied greatly in abundance; there is some relation with proximity of sporophores. The limitations of this method for assessing the risk of stump infection in plantations are discussed; by standardization of sampling, which is best confined to branches at intervals along a ride, it is possible to group the resultant spore counts into 1 of 5 categories, from 'undetectable', $< 5/10$ g. foliage, to 'high', > 500.

Jones (T. W.) & Bretz (T. W.). **First report of tree mortality from Fomes annosus root rot in Missouri.** — *Plant Dis. Reptr*, **42**, 8, p. 988, 1958.

F. annosus [**33**, 512] was identified as the cause of extensive mortality following root rot in a plantation of short leaf pine (*Pinus echinata*) in Washington County, Miss., in Nov. 1956, 4 yr. after thinning. This is believed to be the 1st report of its occurrence on living trees in this State, the only previous report (1906) being on timber. In 1957 about 10% of the trees had died and additional losses in the future can be expected.

Morville (K.). **Trametes i en slangegranbevoksning.** [*Fomes annosus* in a plantation of 'snake' Spruce.] — *Dansk Skorforen. Tidsskr.*, **43**, 4, pp. 221–230, 1958. [*For. Abstr.*, **19**, 4, pp. 551–552, 1958.]

The distribution in a plantation of the 38-yr.-old progeny of a single 'snake' tree was analysed in 1957. There were 400 normal, 45 intermediate, and 32 'snake' trees, the latter reacting to *F. annosus* [**38**, 632] like normal spruce. Of the marginal trees, 58% were sound, possibly owing to greater size, compared with 23% inside. Sound trees were more prevalent where surface blown sand was 40–60 cm. thick, also there were 40% sound trees among those of 6–8 cm. diam., $< 20\%$

10–16 cm., and 80% 28–30 cm. Heaviest damage occurred mostly in the 8–14 cm. class; trees > 24 cm. were seldom badly damaged. The proportion of sound trees increased with height above 8–9 m.; those > 17 m. were badly damaged. Height and diam. increment decreased with increased intensity of attack after damage had attained 1–2 m. in the trunk.

Davidson (R. W.), Toole (E. R.), & Campbell (W. A.). **A preliminary note on the cause of 'pecky' Cypress.**—*Plant Dis. Reptr*, **43**, 7, pp. 806–808, 1 fig., 1959.

At the Forest Disease Res. Lab., Beltsville, cultures from spores of a *Stereum* sp. found on a standing *Taxodium distichum* tree were found to resemble those of isolates from timber affected by 'pecky' decay [**18**, 772], the cause of which has not hitherto been definitely determined. The fungus is to be studied in more detail.

Schreiber (L. R.) & Green (R. J.). **Die-back and root rot disease of Taxus spp. in Indiana.**—*Plant Dis. Reptr*, **43**, 7, pp. 814–817, 4 fig., 1959.

At Purdue Univ., Lafayette, Iowa, a die-back and root rot of young plants of *Taxus* spp. was shown by isolation and re-inoculation via the soil to be caused by *Phytophthora cinnamomi* [cf. **24**, 295]. Infection and disease development are dependent upon soil conditions unfavourable to the plant, particularly high moisture.

Hatfield (I.). **Research needed on major problems of wood preservation.**—*For. Prod. J.*, **9**, 5, pp. 26A–29A, 5 fig., 1959.

This is a short popular review pointing out the fields in which the current need for research is greatest.

Gill (H. J.). **Treating Ponderosa Pine millwork by the vacuum process.**—*For. Prod. J.*, **9**, 5, pp. 149–153, 7 fig., 7 graphs, 1959.

This account is based on 6 yr. experience at Caradco Inc., Dubuque, Iowa. Comparison of data from an extensive series of samples indicated that the vacuum cycle used was equivalent to a 3 min. atmospheric dip, and the same data permitted determination of the frequency of occurrence of sinker stock, indicating that there is no correlation between sp. gr. and absorption of penta[chlorophenol]. In a laboratory model comparison of the wts. of roughly comparable loads of timber before and after treatment by the 2 methods indicated that the vacuum system gave 13·8% better retention: with closely comparable samples the figure was 19%. The penetration and retention achieved conform to NWMA requirements. A number of further findings emerged from the study, viz. the incidence of sinker stock was of the order of 2–3% of the samples; this appears to be a localized condition, matched samples not conforming in this respect; the sp. gr. of sapwood samples varies over a relatively wide range; and the pentachlorophenol content of the tank solutions remains constant during daily use.

Baechler (R. H.). **Improving wood's durability through chemical modification.**—*For. Prod. J.*, **9**, 5, pp. 166–171, 1959.

While most research in this field is concerned with the discovery of better toxic substances for the protective impregnation of timber, there are other lines of approach, of which the most promising is probably the chemical modification of cellulose to prevent its dissolution by fungal enzymes. A method of this type, studied in recent years at the Forest Products Lab., U.S. Dept Agric., Madison, is the cyanoethylation process, which has been applied to cotton, in which wood is treated with an aqueous solution of acrylonitrile and an alkali (usually ammonia), and then heated. In experiments with pine sapwood blocks and the test fungus *Lenzites trabea* steaming (115° C. at 15 lb./sq. in.) gave the most consistent results. Chemical analyses of the treated blocks indicated that a modification corresponding to

approx. 1% by wt. of fixed N is needed to prevent attack, and this applied also to gum [? *Eucalyptus*] sapwood blocks exposed to *Polyporus* [*Polystictus*] *versicolor*. When *L. trabea* was treated with aqueous extracts from resistant blocks there was no toxic effect. Studies to the present time have indicated that a level of treatment adequate to impart decay resistance has no significant effect on dimensional stabilization.

Work is also being done to test the possibility that by destroying the thiamine present in the wood it may be possible to prevent the growth of wood-destroying fungi, most of which are dependent on this vitamin [cf. **35**, 252]. Experimental difficulties prevent any decisive conclusions as yet. A 3rd line of approach is presented by the possibility of inactivating trace elements in the timber in such a way as to render them unavailable. The attraction of this is that it might conceivably be managed with the use of small amounts of the reacting chemical, though it would be of little use if the timber were to be brought into contact with soil. Experiments so far have been limited to the treatment of blocks with an alkaline salt of EDTA (which chelates Cu, Zn, Mn, and Mg under alkaline conditions) together with various amounts of alkali. Protection against rotting by *L. trabea* was obtained when the initial retention was 0·09 lb. EDTA+0·6 lb. ammonia cu. ft. The exact nature of the protection has not yet been discovered. Tests with other chelating agents are under way.

Björkman (E.). **Sulphur dioxide as a preservative against wood fungi.**—*Svensk Trävarutidn., 1959*, 3, pp. 134, 137–138, 5 fig., 1959.

In the 1st test method used at the Statens Skogsforskningsinstitut, Stockholm, pine sapwood blocks, 5 × 2 × 1·5 cm., were placed in open Petri dishes at the bottom of 3 gas-tight glass cabinets of 500 l. vol., the walls of which were disinfected with 70% alcohol. Each block was inoculated in 2 places with a pure culture of a blue-stain fungus. As soon as growth was observed (usually in 2 days), SO_2 was introduced in such a way as to maintain a relatively constant conc. of 10, 20, or 40 p.p.m. for 10 days. Similar blocks were placed in a cabinet without gas. No details are furnished of the results, but a figure clearly shows the progressive reduction in infection by *Pullularia pullulans* at the several conc.

The 2nd method involved the introduction of SO_2 at 100, 500, and 1,000 p.p.m. into 1-l. Erlenmeyer flasks containing cultures on malt extract agar of 5 blue-stain and 2 wood-rotting spp., when the cultures were 10 mm. diam.; the conc. was controlled on alternate days, being maintained fairly constant for 12 days by fresh supplies. At the close of the experiment, when the diam. of the untreated controls was 60 mm., the measurements for *P. pullulans* at the 3 conc. were 45, 22, and 15, respectively; *Cladosporium herbarum* 50, 30, and 24; *Leptographium lundbergii* [cf. **33**, 394; **36**, 148] 54, 51, and 5; *Trichoderma lignorum* [*T. viride*] 30, 15, and 5; *Phialophora fastigiata* and *Stereum sanguinolentum* 55, 5, and 5; and *Merulius lacrymans* 10, 5, and 5. The following were lethal: 1,000 p.p.m. to *L. lundbergii*, 500 and 1,000 to *P. fastigiata* and *S. sanguinolentum*, and all to *M. lacrymans*.

Da Costa (E. W. B.) & Rudman (P.). **The causes of natural durability of timber. I. The role of toxic extractives in the resistance of Tallowwood (Eucalyptus microcorys F. Muell.) to decay.** *Aust. J. biol. Sci.*, **2**, 1, pp. 45–57, 1 pl., 2 graphs, 1958.

At the Div. Forest Products, C.S.I.R.O., S. Melbourne, successive extracts of sawdust from the outer heartwood of *E. microcorys*, a highly durable timber, were made with ether, methanol, acetone, water, and 0·01N NaOH. The test fungi, *Trametes lilacino-gilva*, *Coniophora cerebella* [*C. puteana*], *Coriolus* [*Polystictus*] *versicolor*, and *Fomes durus*, were cultured on strips of *Ceratopetalum apetalum* veneer in nutrient jars [cf. **25**, 588] until the strip was covered, when a weighed amount of air-dried sawdust in a perforated aluminium foil dish (milk-bottle caps), sterilized

at air temp. with propylene oxide [**26**, 461], was placed on top of each strip for 7 weeks in the case of *C. puteana*, 9 for *T. lilacino-gilva*, and 14 for the other 2 spp., the sawdust was then oven dried for 48 hr. at 105° and reweighed. The material removed by each solvent was also incorporated in heartwood sawdust of the decay-susceptible *E. regnans* in conc. (w/w) equal to those in *E. microcorys* and tested by each fungus. Dilution tests were also carried out with the methanol extract by incorporating it with 2% agar and 4% carboxymethylcellulose, mixed as powders in phials, and adding 2% malt extract in tap water, the mixture was then steamed, stirred, solidified on one side of the phial, and sterilized with propylene oxide. Linear growth of the fungi on this medium was then measured.

As *E. microcorys* sawdust proved highly resistant to decay the gross anatomical structure of the timber cannot contribute much to its resistance: even after 30 weeks' incubation wt. loss was negligible except with *F. durus* (25%). Methanol extraction (12–15% of oven dry wt.) produced a highly significant loss of decay resistance, but no other type of extraction produced a consistent effect. Even after extraction the sawdust was significantly more resistant than unextracted *E. regnans* to attack by *T. lilacino-gilva* and *F. durus*, though not to the other 2 spp. Only the methanol extract proved toxic to the fungi in protecting *E. regnans* sawdust.

Da Costa (E. W. B.). **Abnormal resistance of Poria vaillantii (DC. ex Fr.) Cke strains to copper-chrome-arsenate wood preservatives.**—*Nature, Lond.*, **183**, 4665, pp. 910–911, 1959.

Initial tests by the C.S.I.R.O., Melbourne, employing a modified sawdust dish-soil jar decay resistance test [see above] with a typical proprietary preservative of the copper-chrome-arsenate type impregnated into air-dry sapwood sawdust of *Pinus radiata*, which was incubated with *Poria vaillantii* at 25° C. and 99% R.H. for 5 weeks, showed that the high tolerance of 1 strain of the fungus to the usual conc. of the preservative was not shared by *P.* spp. of similar habit, or by all strains of *P. vaillantii* [cf. **38**, 232]. Strain DFP 4443 was the most tolerant of 3 tolerant strains of very diverse origin isolated from *Pinus radiata* treated with copper-chromate preservative. The total inhibition point (min. conc. of preservative necessary to reduce wt. loss to zero) was computed for a number of preservatives. The resistance of strain DFP 4443 to Cu and Zn was higher than expected from previous studies of *Poria* spp.; it was also more tolerant of arsenic than *Lenzites trabea*.

Bletchly (J. D.). **Soft rot in Beech—its influence on furniture beetle attack.**—*Timb. Tech.*, **67**, 2241, pp. 295, 297–299, 1 graph, 1959.

This is a progress report on further work [cf. **33**, 126] at the Entomology Section, Forest Products Research Laboratory, Princes Risborough, now concerned with the influence of soft rots [cf. **37**, 383] on *Anobium punctatum* [**33**, 126] infestation of hardwood. It has proved difficult to promote soft-rotting of softwoods under laboratory conditions.

Beech blocks $10 \times 6 \times \frac{1}{2}$ cm. from the inner, middle, and outer zones of the sapwood were oven-dried at 103° C., sprayed with a spore suspension of *Chaetomium globosum*, and kept at 25° and 90% R.H. During incubation no fruiting bodies of this fungus were seen, but a *Phoma* sp. [**37**, 123] established itself. Wt. loss determinations on samples taken at 6-month intervals showed that decay progressed at approximately the same rate in all 3 zones. Blocks representing a range of wt. loss (2–14%) were exposed (covered in muslin) to egg-laying beetles, maintained at 22° and 86% R.H. for 19–22 months, then cut up with a hand razor when the live larvae were recovered and weighed. The presence of soft rot increased the suitability of the sapwood of all 3 zones for the nutrition of the larvae, the only 2 exceptions being in samples in the lowest range of wt. loss.

Water-borne wood preservatives. I. Composition of commercial cresols and their nitrated products. II. Determination of fluorine with thorium nitrate solution. III. Significance of antimony fluoride double salt contained in the wood preservative, sodium fluoride dinitrophenolate. IV. Application of the cup method for assaying the inhibitory effect of water-borne preservatives on the growth of fungi. V. Effects of pH of the chloro- or nitrophenol solution upon antifungal activity. VI. Prevention of mold growth on Bamboo stem treated with antifungal chemicals. VII. Result of evaluation of wood preservatives against decay of wood.—*Mokuzai Gakkaishi*, **4**, pp. 46–50, 106–117, 165–175, 237–242, 1958; **5**, pp. 31–38, 1959. [*Chem. Abstr.*, **52**, 14, col. 12297 d; 21, col. 18989 i, 1958; **53**, 11, col. f., 1959.]

Nos. I, II, III, V, and VI in this series of papers from the University of Tokyo were contributed by T. Inoue and T. Shibamoto and Nos. IV and VII by the same authors with Y. Kenjo.

Five samples of commercial cresol were analysed for their phenol and *o*-, *m*-, and *p*-cresol contents. Dinitrophenols were obtained by nitration of previously sulphonated phenol and isomeric cresol. Dinitrophenols contained in Wolman salts were analysed by infra-red absorption spectra between 12 and 14 μ.

For the determination of F in preservatives containing NaF and dinitrophenolate or in treated wood the $Th(NO_3)_4$ volumetric method was superior to the CaF_2 gravimetric procedure in simplicity, applicability, and accuracy.

The leaching of Na 4,6-dinitro-*o*-cresolate from filter paper, wood powder, and wood pieces was not prevented to any extent by joint impregnation with Sb-F double salts.

Of various F compounds and nitrophenols tested, NaF, KF, $NaSbF_4$, Na_2SO_4, $SbF_2(NH_4)_2SO_4$, SbF_2, $CH_2FCOONa$, and Na 4,6-dinitro-*o*-cresolate exerted a powerful inhibitory effect on the growth of *Poria vaporaria*, *Trametes sanguinea* [**36**, 440], and *Irpex lacteus*. The results of the 2 methods used in these tests, i.e. the cup and the wood-block (Japanese Industrial Standard A9302), were in agreement.

The results of tests by the cup and poisoned-agar methods showed that, in general, chloro- and nitrophenols were more toxic at lower pH levels. In field trials with some phenolic chemicals used against [unspecified] moulds on bamboo stems [cf. **35**, 253] 0·5% *p*-nitrophenol at pH 4–4·4 proved more effective than 2% Na pentachlorophenolate at pH 8·4–8·6.

The efficiency and permanence of 48 preservatives used against wood decay were compared by means of the standard wood-block method slightly modified.

Czaja (A. T.). **Über das Aufkommen des echten Hausschwammes (Merulius lacrymans var. domesticus (Pers.) Falck) und des braunen Kellerschwammes (Coniophora cerebella (Pers.) Duby) aus ihren Sporen an verbautem Holz.** [On the growth of the true house fungus (*M.l.* var. *domesticus*) and the brown cellar fungus (*C. puteana*) from their spores on timber in buildings.]—*Angew. Bot.*, **33**, 3, pp. 107–121, 1959.

From further studies [cf. **38**, 431] at the Botanisches Institut der Technischen Hochschule, Aachen, Germany, the author concludes that spores of *M. lacrymans* have a greater longevity than hitherto accepted and thus play a much more important part in the dissemination of this fungus. The spores of *C. puteana* germinate readily on new wood. The occurrence of *M. lacrymans* mainly in older buildings can be explained by the presence in new wood of certain substances which inhibit the germination of *M. lacrymans* and also by the absence of the other organisms which assist the germination of the spores. The opt. germination conditions develop with increasing age of the wood, especially with the introduction of dampness when moulds and other fungi, as well as yeasts (and bacteria) develop.

Timber should, therefore, be given protective treatment against apparently harmless contaminants.

Findlay (W. P. K.). **Sap-stain of timber.**—*For. Abstr.*, **20**, 1, pp. 1–7; 2, pp. 167–174, 1959. [90 ref. Reprints from C.A.B., 3*s.* 6*d.*]

This comprehensive review from the Forest Products Res. Lab., Princes Risborough, summarizes information on the causal fungi, mode of infection and relevant factors, effect on wood and sometimes on the contents of wooden containers, and prevention and economic significance [cf. **37**, 607; **38**, 108 *et passim*].

Zabel (R. A.). **Fungus losses in the paper industry and related research needs.**—*Tappi*, **42**, 5, pp. 28A, 30A, 32A, 34A, 1959. [24 ref.]

Up-to-date information on actual or potential losses is presented and methods of approach to the problems of prevention and control are suggested for diseases of trees used for pulpwood deterioration in storage, and slime formation, with a brief note on building decay. The various fungi and the types of decay they induce are tabulated.

Maklakova (Mme G. F.). Условия заражения Капусты с килой. [Conditions for the infection of Cabbage by club root.]—*Proc. Lenin Acad. agric. Sci.*, **23**, 2, pp. 31–36, 2 fig., 1958.

At the State farm, Krasnaya rechka, Efimov region, U.S.S.R., Slava cabbage seedlings were grown in fields, where turnips were grown previously, to clarify the causes and conditions for club root [*Plasmodiophora brassicae*: **38**, 233]. On high ground infection was slight (up to 15%) while at low altitudes incidence was 63%. It was evident that the seedlings were not always infected before transplanting and infection can occur late in the growing period. The 'square' method of planting proved the best as it ensured better aeration of the roots and possibilities of weed control. Growing the seeds in the greenhouse in peat with 'AMB' [? a microbial complex], and in pots with peat and manure without soil is recommended.

Lur'e (L. S.) & Ter-Simonyan (L. G.). О возможности использования гамма-излучения для обеззараживания почвы и борьбы с килой Крестоцветных. [On the possibility of using gamma-radiation for soil disinfection and control of club root of Cruciferae.]—*Proc. Lenin Acad. agric. Sci.*, **24**, 6, pp. 28–29, 1959.

Experiments by the All-Union sci. Res. Inst. for Electrification of Agric. and the sci. Res. Inst. Hort., Moscow, U.S.S.R., on the disinfection of soil in nurseries and under glass [cf. **38**, 352], particularly against club root [*Plasmodiophora brassicae*) [see above] in cabbage, showed that sterilization can be achieved by exposing the soil to gamma-radiation in a special apparatus. Rays from Co 60 at > 50,000 roentgen u. prevent the development of club root, and from 5,000 roentgen u. upwards stimulate the growth of cabbage, 5,000–50,000 r.u. giving a 22–34% increase of green matter.

Natti (J. J.). **Control of downy mildew of Broccoli with fungicides and fungicide-streptomycin combination sprays.**—*Plant Dis. Reptr*, **43**, 7, pp. 735–740, 1959.

In further tests at N.Y. State agric. Exp. Sta., Geneva [cf. **37**, 255], in 1957–8 the best field control of *Peronospora parasitica* on broccoli was obtained with Cu–Zn (4 or 6 lb./acre), Cu-Zn or manzate+agristrep (3+1 or 4+0·4) as effective strengths of streptomycin alone were too phytotoxic, and 4·6 lb. agrimycin 500 (Cu+streptomycin), in weekly sprays from late Aug. to late Sept. The systemic action of the streptomycin and tenacity of the Cu counter severe weather conditions. Cu–Zn (but not manzate) + agristrep, though little better than Cu–Zn alone during spraying, was markedly more effective 21 days later. Disease incidence was less when spraying was begun before the broccoli headed.

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